

# PHILIPS

# 26PF4310

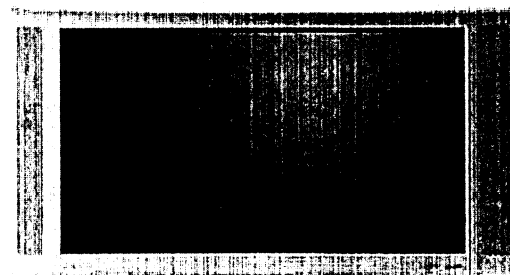
MODEL

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SERVICE MANUAL

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# Service Service Service

E 14710 000 NPM  
240604

# Service Manual

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# 1. Technical Specifications, Connections, and Chassis Overview

## Index of this chapter:

- 1.1 Technical Specifications
- 1.2 Connection Overview
- 1.3 Chassis Overview

### Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

## 1.1 Technical Specifications

### 1.1.1 Vision

|                                   |                        |
|-----------------------------------|------------------------|
| Display type                      | : LCD, IPS             |
| Screen size                       | :                      |
| - 26PF4310/10                     | : 26" (66 cm), 15:9    |
| - 26PF5320/10                     | : 26" (66 cm), 16:9    |
| - 32PF5320/10                     | : 32" (82 cm), 16:9    |
| - 32PF7320/10                     | : 32" (82 cm), 16:9    |
| Resolution (HxV pixels)           | :                      |
| - 26PF4310/10                     | : 1280 x 768           |
| - 26PF5320/10                     | : 1366 x 768           |
| - 32PF5320/10                     | : 1366 x 768           |
| - 32PF7320/10                     | : 1366 x 768           |
| Contrast ratio                    | :                      |
| - 26PF4310/10                     | : 500:1                |
| - 26PF5320/10                     | : 600:1                |
| - 32PF5320/10                     | : 600:1                |
| - 32PF7320/10                     | : 600:1                |
| Light output (cd/m <sup>2</sup> ) | :                      |
| - 26PF4310/10                     | : 400                  |
| - 26PF5320/10                     | : 500                  |
| - 32PF5320/10                     | : 500                  |
| - 32PF7320/10                     | : 500                  |
| Response time (ms)                | :                      |
| - 26PF4310/10                     | : 16                   |
| - 26PF5320/10                     | : 16                   |
| - 32PF5320/10                     | : 18                   |
| - 32PF7320/10                     | : 18                   |
| Viewing angle (HxV degrees)       | :                      |
| - 26PF4310/10                     | : 176x176              |
| - 26PF5320/10                     | : 178x178              |
| - 32PF5320/10                     | : 176x176              |
| - 32PF7320/10                     | : 176x176              |
| Tuning system                     | : PLL                  |
| TV Colour systems                 | : PAL B/G, D/K, I      |
|                                   | : SECAM B/G, D/K, L/L' |
| Video playback                    | :                      |
| - 26PF4310/10                     | : PAL B/G; SECAM L/L'  |
| - 26PF5320/10                     | :                      |
| - 32PF5320/10                     | : NTSC M/N 3.58, 4.43  |
| - 32PF7320/10                     | : PAL B/G              |
|                                   | : SECAM L/L'           |
| Supported computer formats        | : VGA (640x480)        |
|                                   | : MAC (640x480)        |
|                                   | : SVGA (800x600)       |
|                                   | : XWGA (1024x768)      |
|                                   | : WXGA (1280x768)      |
| Supported video formats           | : 640x480 - 11H        |
|                                   | : 720x576 - 11H        |
|                                   | : 640x480p - 21H       |
|                                   | : 720x576p - 21H       |
|                                   | : 1920x1080i - 21H     |
| Presets/channels                  | : 100 presets          |
| Tuner bands                       | : VHF                  |
|                                   | : UHF                  |
|                                   | : S-band               |
|                                   | : Hyper-band           |

### 1.1.2 Sound

|                                   |                        |
|-----------------------------------|------------------------|
| Sound systems                     | : FM-mono              |
|                                   | : FM-stereo B/G        |
|                                   | : NICAM B/G, D/K, I, L |
|                                   | : AV Stereo            |
| Maximum power (W <sub>RMS</sub> ) | :                      |
| - 26PF4310/10                     | : 2 x 5                |
| - 26PF5320/10                     | : 2 x 5                |
| - 32PF5320/10                     | : 2 x 15               |
| - 32PF7320/10                     | : 2 x 15               |

### 1.1.3 Miscellaneous

|                                    |                       |
|------------------------------------|-----------------------|
| Power supply:                      | :                     |
| - Mains voltage (V <sub>AC</sub> ) | : 95 - 240            |
| - Mains frequency (Hz)             | : 50 / 60             |
| Ambient conditions:                | :                     |
| - Temperature range (°C)           | : -5 to +40           |
| - Maximum humidity                 | : 90% R.H.            |
| Power consumption                  | :                     |
| - Normal operation (W)             | : ≈ 96                |
| - Stand-by (W)                     | : < 1                 |
| Dimensions (WxHxD cm)              | :                     |
| - 26PF4310/10                      | : 79.2 x 43.1 x 24.2  |
| - 26PF5320/10                      | : 80.45 x 47.7 x 22.2 |
| - 32PF5320/10                      | : 92.4 x 55.0 x 22.2  |
| - 32PF7320/10                      | : 92.4 x 55.0 x 22.2  |
| Weight (kg)                        | :                     |
| - 26PF4310/10                      | : 15                  |
| - 26PF5320/10                      | : 16                  |
| - 32PF5320/10                      | : 18.2                |
| - 32PF7320/10                      | : 18.2                |

## 1.2 Connection Overview

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

### 1.2.1 Side I/O connections

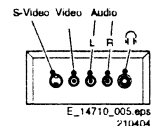


Figure 1-1 Side I/O connections

#### SVHS (Hosiden): Video Y/C - In

|              |                              |   |
|--------------|------------------------------|---|
| 1 - Ground Y | Gnd                          | + |
| 2 - Ground C | Gnd                          | + |
| 3 - Video Y  | 1 V <sub>pp</sub> / 75 ohm   | + |
| 4 - Video C  | 0.3 V <sub>pp</sub> / 75 ohm | + |

#### Cinch: Video CVBS - In, Audio - In

|                 |                                |   |
|-----------------|--------------------------------|---|
| Ye - Video CVBS | 1 V <sub>pp</sub> / 75 ohm     | + |
| Wh - Audio L    | 0.5 V <sub>RMS</sub> / 10 kohm | + |
| Rd - Audio R    | 0.5 V <sub>RMS</sub> / 10 kohm | + |

#### Mini Jack: Audio Head phone - Out

Bk - Head phone 32 - 600 ohm / 10 mW

### 1.2.2 Rear Connections

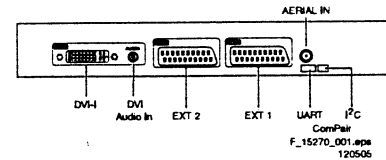


Figure 1-2 Rear I/O

#### Aerial - In

- IEC-type (EU) Coax, 75 ohm

#### Mini Jack: PC-Audio - In

|             |                                |   |
|-------------|--------------------------------|---|
| 1 - Ground  | Gnd                            | + |
| 2 - Audio L | 0.5 V <sub>RMS</sub> / 10 kohm | + |
| 3 - Audio R | 0.5 V <sub>RMS</sub> / 10 kohm | + |

#### Service connector (ComPair)

|            |                     |   |
|------------|---------------------|---|
| 1 - SDA-S  | I²C Data (0 - 5 V)  | + |
| 2 - SCL-S  | I²C Clock (0 - 5 V) | + |
| 3 - Ground | Gnd                 | + |

#### Service connector (UART)

|             |          |   |
|-------------|----------|---|
| 1 - UART_TX | Transmit | + |
| 2 - Ground  | Gnd      | + |
| 3 - UART_RX | Receive  | + |

#### DVI-I: Digital/Analogue Video - In

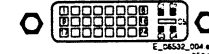


Figure 1-3 DVI-I connector

|                  |                              |   |
|------------------|------------------------------|---|
| 1 - D2-          |                              | + |
| 2 - D2+          |                              | + |
| 3 - Shield       | Gnd                          | + |
| 4 - D4-          |                              | + |
| 5 - D4+          |                              | + |
| 6 - DDC_SCL      | DDC clock                    | + |
| 7 - DDC_SDA      | DDC data                     | + |
| 8 - V-sync       | 0 - 5 V                      | + |
| 9 - D1-          |                              | + |
| 10 - D1+         |                              | + |
| 11 - Shield      | Gnd                          | + |
| 12 - D3-         |                              | + |
| 13 - D3+         |                              | + |
| 14 - +5V         |                              | + |
| 15 - Ground      | Gnd                          | + |
| 16 - HPD         | Hot Plug Detect              | + |
| 17 - D0-         |                              | + |
| 18 - D0+         |                              | + |
| 19 - Shield      | Gnd                          | + |
| 20 - D5-         |                              | + |
| 21 - D5+         |                              | + |
| 22 - Shield      | Gnd                          | + |
| 23 - CLK+        |                              | + |
| 24 - CLK-        |                              | + |
| C1 - Video Red   | 0.7 V <sub>pp</sub> / 75 ohm | + |
| C2 - Video Green | 0.7 V <sub>pp</sub> / 75 ohm | + |
| C3 - Video Blue  | 0.7 V <sub>pp</sub> / 75 ohm | + |
| C4 - H-sync      | 0 - 5 V                      | + |
| C5 - Ground      | Gnd                          | + |

#### EXT1: Video RGB - In, CVBS - In/Out, Audio - In/Out

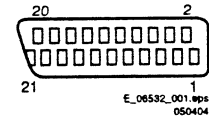


Figure 1-4 SCART connector

|                       |                                |   |
|-----------------------|--------------------------------|---|
| 1 - Audio R           | 0.5 V <sub>RMS</sub> / 1 kohm  | + |
| 2 - Audio R           | 0.5 V <sub>RMS</sub> / 10 kohm | + |
| 3 - Audio L           | 0.5 V <sub>RMS</sub> / 1 kohm  | + |
| 4 - Ground Audio      | Gnd                            | + |
| 5 - Ground Blue       | Gnd                            | + |
| 6 - Audio L           | 0.5 V <sub>RMS</sub> / 10 kohm | + |
| 7 - Video Blue        | 0.7 V <sub>pp</sub> / 75 ohm   | + |
| 8 - Function Select   | 0 - 2 V: INT                   | + |
|                       | 4.5 - 7 V: EXT 16:9            | + |
|                       | 9.5 - 12 V: EXT 4:3            | + |
| 9 - Ground Green      | Gnd                            | + |
| 10 - n.c.             |                                | + |
| 11 - Video Green      | 0.7 V <sub>pp</sub> / 75 ohm   | + |
| 12 - n.c.             |                                | + |
| 13 - Ground Red       | Gnd                            | + |
| 14 - Ground           | Gnd                            | + |
| 15 - Video Red        | 0.7 V <sub>pp</sub> / 75 ohm   | + |
| 16 - Status/FBL       | 0 - 0.4 V: INT                 | + |
|                       | 1 - 3 V: EXT / 75 ohm          | + |
| 17 - Ground Video     | Gnd                            | + |
| 18 - Ground FBL       | Gnd                            | + |
| 19 - Video Terr. CVBS | 1 V <sub>pp</sub> / 75 ohm     | + |
| 20 - Video CVBS/Y     | 1 V <sub>pp</sub> / 75 ohm     | + |
| 21 - Shield           | Gnd                            | + |

#### EXT2: Video Y/C - In, CVBS - In/Out, Audio - In/Out

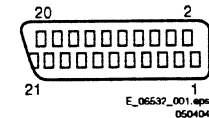


Figure 1-5 SCART connector

|                      |                                |   |
|----------------------|--------------------------------|---|
| 1 - Audio R          | 0.5 V <sub>RMS</sub> / 1 kohm  | + |
| 2 - Audio R          | 0.5 V <sub>RMS</sub> / 10 kohm | + |
| 3 - Audio L          | 0.5 V <sub>RMS</sub> / 1 kohm  | + |
| 4 - Ground Audio     | Gnd                            | + |
| 5 - Ground Blue      | Gnd                            | + |
| 6 - Audio L          | 0.5 V <sub>RMS</sub> / 10 kohm | + |
| 7 - n.c.             |                                | + |
| 8 - Function Select  | 0 - 2 V: INT                   | + |
|                      | 4.5 - 7 V: EXT 16:9            | + |
|                      | 9.5 - 12 V: EXT 4:3            | + |
| 9 - Ground Green     | Gnd                            | + |
| 10 - n.c.            |                                | + |
| 11 - n.c.            |                                | + |
| 12 - n.c.            |                                | + |
| 13 - Ground Red      | Gnd                            | + |
| 14 - Ground          | Gnd                            | + |
| 15 - Y/C/Y - In      | 0.7 V <sub>pp</sub> / 75 ohm   | + |
| 16 - n.c.            |                                | + |
| 17 - Ground Video    | Gnd                            | + |
| 18 - Ground          | Gnd                            | + |
| 19 - Video Mon. CVBS | 1 V <sub>pp</sub> / 75 ohm     | + |
| 20 - Y/C/Y - in      | 0.7 V <sub>pp</sub> / 75 ohm   | + |
| 21 - Shield          | Gnd                            | + |

## 1.3 Chassis Overview

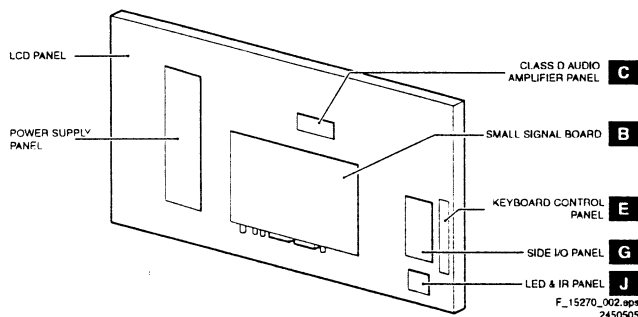


Figure 1-6 Chassis overview

## 2. Safety Instructions, Warnings, and Notes

### Index of this chapter:

- 2.1 Safety Instructions
- 2.2 Warnings
- 2.3 Notes

### 2.1 Safety Instructions

Safety regulations require the following during a repair:

- Connect the set to the Mains (AC Power) via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ▲, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard.

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains (AC Power) lead for external damage.
- Check the strain relief of the Mains (AC Power) cord for proper function.
- Check the electrical DC resistance between the Mains (AC Power) plug and the secondary side (only for sets that have a Mains (AC Power) isolated power supply):
  1. Unplug the Mains (AC Power) cord and connect a wire between the two pins of the Mains (AC Power) plug.
  2. Set the Mains (AC Power) switch to the "on" position (keep the Mains (AC Power) cord unplugged!).
  3. Measure the resistance value between the pins of the Mains (AC Power) plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 Mohm and 12 Mohm.
  4. Switch "off" the set, and remove the wire between the two pins of the Mains (AC Power) plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

### 2.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD ▲). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential. Available ESD protection equipment:
  - Complete kit ESD3 (small tablemat, wristband, connection box, extension cable and earth cable) 4822 310 10671.
  - Wristband tester 4822 344 13999.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched "on".
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

### 2.3 Notes

#### 2.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⊥), or hot ground (⊥), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode (see chapter 5) with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⊥) and without (X) aerial signal. Measure the voltages in the power supply section both in normal operation (⊥) and in stand-by (⊥). These values are indicated by means of the appropriate symbols.
- The semiconductors indicated in the circuit diagram and in the parts lists, are interchangeable per position with the semiconductors in the unit, irrespective of the type indication on these semiconductors.

#### 2.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kohm).
- Resistor values with no multiplier may be indicated with either an "E" or an "R" (e.g. 220E or 220R indicates 220 ohm).
- All capacitor values are given in micro-farads ( $\mu$ =  $\times 10^{-6}$ ), nano-farads (n=  $\times 10^{-9}$ ), or pico-farads (p=  $\times 10^{-12}$ ).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An "asterisk" (\*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed in the Spare Parts List. Therefore, always check this list when there is any doubt.

#### 2.3.3 Rework on BGA (Ball Grid Array) ICs

##### General

Although (LF)BGA assembly yields are very high, there may still be a requirement for component rework. By rework, we mean the process of removing the component from the PWB and replacing it with a new component. If an (LF)BGA is removed from a PWB, the solder balls of the component are deformed drastically so the removed (LF)BGA has to be discarded.

##### Device Removal

As is the case with any component that is being removed, it is essential when removing an (LF)BGA, that the board, tracks, solder lands, or surrounding components are not damaged. To remove an (LF)BGA, the board must be uniformly heated to a temperature close to the reflow soldering temperature. A uniform temperature reduces the risk of warping the PWB. To do this, we recommend that the board is heated until it is certain that all the joints are molten. Then carefully pull the component off the board with a vacuum nozzle. For the appropriate temperature profiles, see the IC data sheet.

##### Area Preparation

When the component has been removed, the vacant IC area must be cleaned before replacing the (LF)BGA. Removing an IC often leaves varying amounts of solder on the mounting lands. This excessive solder can be removed with either a solder sucker or solder wick. The remaining flux can be removed with a brush and cleaning agent.



After the board is properly cleaned and inspected, apply flux on the solder lands and on the connection balls of the (LF)BGA.  
**Note:** Do not apply solder paste, as this has been shown to result in problems during re-soldering.

#### Device Replacement

The last step in the repair process is to solder the new component on the board. Ideally, the (LF)BGA should be aligned under a microscope or magnifying glass. If this is not possible, try to align the (LF)BGA with any board markers. So as not to damage neighbouring components, it may be necessary to reduce some temperatures and times.

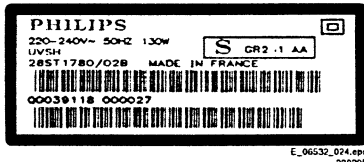
#### More Information

For more information on how to handle BGA devices, visit this URL: [www.atyourservice.ce.philips.com](http://www.atyourservice.ce.philips.com) (needs subscription, not available for all regions). After login, select "Magazine", then go to "Workshop Information". Here you will find information on how to deal with BGA-ICs.

#### 2.3.4 Lead-free Solder

Philips CE is producing lead-free sets (PBF) from 1.1.2005 onwards.

**Identification:** The bottom line of a type plate gives a 14-digit serial number. Digits 5 and 6 refer to the production year, digits 7 and 8 refer to production week (in example below it is 1991 week 18).



E\_06532\_074.eps  
230205

Figure 2-1 Serial number example

Regardless of the special lead-free logo (which is not always indicated), one must treat all sets from this date onwards according to the rules as described below.



Figure 2-2 Lead-free logo

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin Philips SAC305 with order code 0622 149 00106. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
  - To reach a solder-tip temperature of at least 400°C.
  - To stabilise the adjusted temperature at the solder-tip.
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilised at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed.

To avoid wear-out of tips, switch "off" unused equipment or reduce heat.

- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly to avoid mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.
- Use only original spare-parts listed in the Service-Manuals. Not listed standard material (commodities) has to be purchased at external companies.
- Special information for lead-free BGA ICs: these ICs will be delivered in so-called "dry-packaging" to protect the IC against moisture. This packaging may only be opened shortly before it is used (soldered). Otherwise the body of the IC gets "wet" inside and during the heating time the structure of the IC will be destroyed due to high (steam-) pressure inside the body. If the packaging was opened before usage, the IC has to be heated up for some hours (around 90°C) for drying (think of ESD-protection!).  
**Do not re-use BGAs at all!**
- For sets produced before 1.1.2005, containing leaded soldering tin and components, all needed spare parts will be available till the end of the service period. For the repair of such sets nothing changes.

In case of doubt whether the board is lead-free or not (or with mixed technologies), you can use the following method:

- Always use the highest temperature to solder, when using SAC305 (see also instructions below).
- De-solder thoroughly (clean solder joints to avoid the mixing of two alloys).

**Caution:** For BGA-ICs, you must use the correct temperature profile, which is coupled to the T2NC. For an overview of these profiles, visit the website [www.atyourservice.ce.philips.com](http://www.atyourservice.ce.philips.com) (needs subscription, but is not available for all regions). You will find this and more technical information within the "Magazine", chapter "Workshop information". For additional questions please contact your local repair help desk.

#### 2.3.5 Practical Service Precautions

- It makes sense to avoid exposure to electrical shock. While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- Always respect voltages. While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

## 3. Directions for Use

You can download this information from the following websites:

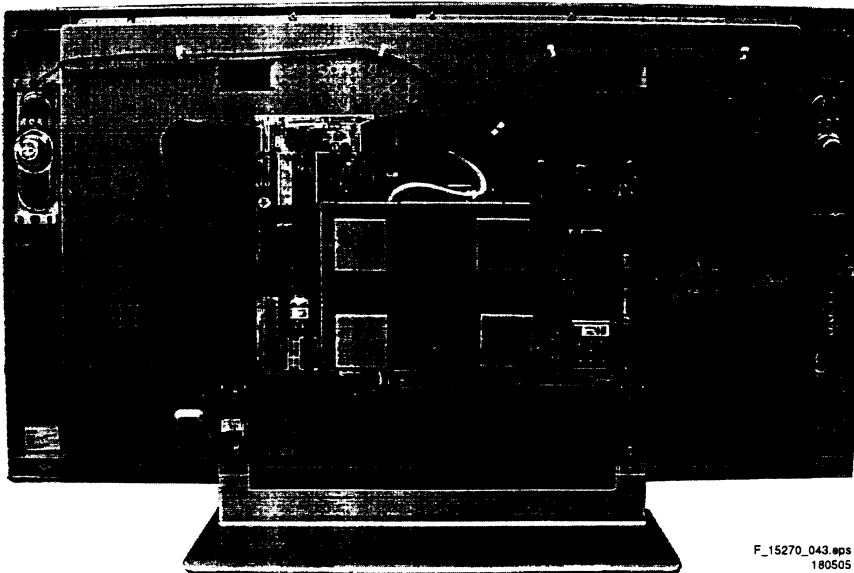
<http://www.philips.com/support>  
<http://www.p4c.philips.com>

## 4. Mechanical Instructions

### Index of this chapter:

- 4.1 Cable Dressing
- 4.2 Service Position
- 4.3 Assy/Panel Removal
- 4.4 Set Re-assembly

### 4.1 Cable Dressing



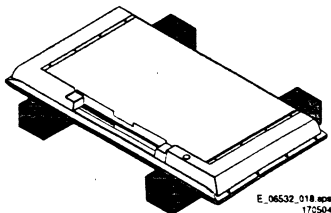
F\_15270\_043.aps  
180505

Figure 4-1 Cable dressing

### 4.2 Service Position

First, put the TV set in its service position. Therefore, place it upside down on a table top (use a protection sheet or foam bars).

#### 4.2.1 The Foam Bars



E\_06532\_018.aps  
170504

Figure 4-2 Foam bars

### Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.
- Follow the disassembling instructions in described order.

The foam bars (order code 3122 785 90580) can be used for all types and sizes of Flat TVs. By laying the plasma or LCD TV flat on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By first placing a mirror flat on the table under the TV you can easily see if something is happening on the screen.

### 4.3 Assy/Panel Removal

#### 4.3.1 Rear Cover

**Warning:** Disconnect the mains power cord before you remove the rear cover.

1. Remove the screws that secure the rear cover.
2. Lift the rear cover from the cabinet cautiously. Make sure that wires and other internal components are not damaged during cover removal.

#### 4.3.2 Side I/O Panel

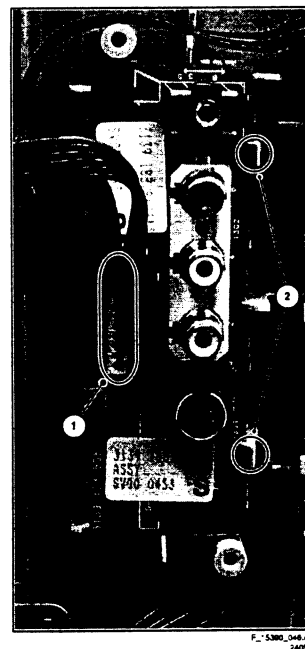
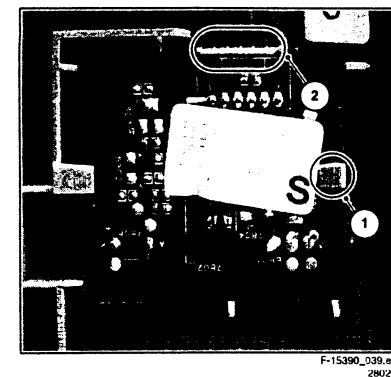


Figure 4-3 Side I/O panel

1. Disconnect the cable (1) from the panel.
2. Release the two fixation clamps (2) and lift the panel out of the bracket.

#### 4.3.3 LED Panel



F\_15390\_039.aps  
280205

Figure 4-4 LED panel

1. Release the fixation clamp (1) and take the panel out of the bracket.
2. Disconnect the cable (2) from the panel.

#### 4.3.4 Keyboard Control Panel

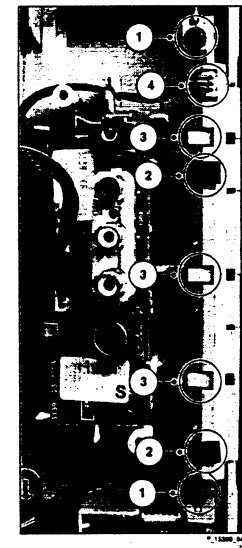


Figure 4-5 Keyboard control panel

1. Remove the two fixation screws (1) from the bracket and take out the panel/bracket combination.
2. Remove the fixation tape (2) from the panel/bracket combination.
3. Release the three fixation clamps (3) and lift the panel out of the bracket.
4. Disconnect the cable (4) from the panel.

#### 4.3.5 SSB Board Cover Shield (depending on model)

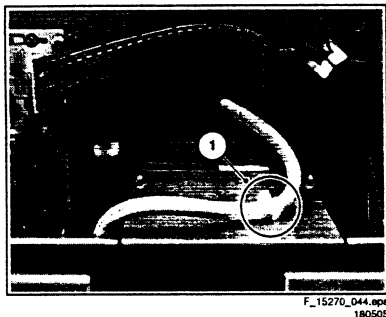


Figure 4-6 Cable clip on cover shield

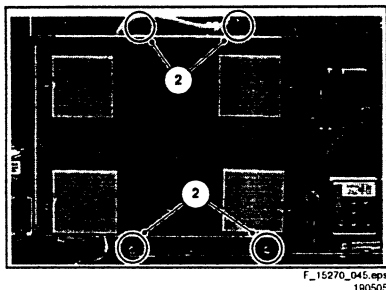


Figure 4-7 SSB board cover shield

1. Release the cable from the plastic cable clip (1) on the shield (see Figure "Cable clip on cover shield" above).
2. Remove the four fixation screws (2, see Figure "SSB board cover shield"; the screws are also indicated by arrows on the shield) and remove the shield.  
Notice that on one side, the shield is not only held by two screws, but also by two brackets (see Figure "Cable clip on cover shield" above).

#### 4.3.6 SSB Board

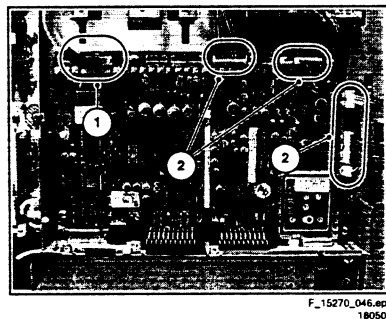


Figure 4-8 SSB board connectors

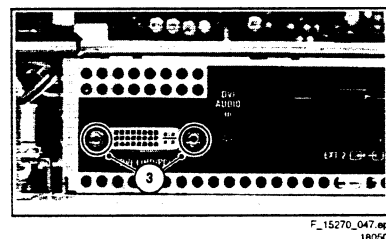


Figure 4-9 DVI-I connector screws

1. Very cautiously disconnect the LVDS cable (1) from the panel (see Figure "SSB board connectors"). Notice that this cable is very fragile.
2. Disconnect the six remaining cables (2) from the panel.
3. Remove the fixation screws that secure the SSB board (depending on model) and also the two fixation screws (3) from the DVI-I connector on the SSB board (see Figure "DVI-I connector screws").
4. Take the panel out of its brackets.

#### 4.3.7 Power Supply Panel (various models used)

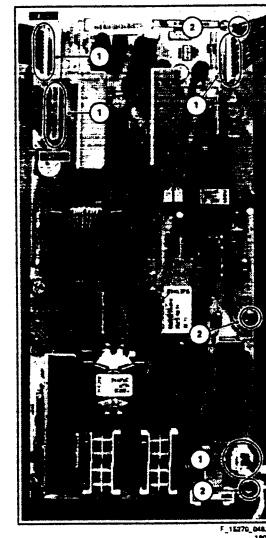


Figure 4-10 Power supply panel

1. Disconnect all cables (1) from the panel.  
Notice that the two connectors for X520 and X530 on this panel are similar, and should not be mixed up later when they are reconnected (X520 is connected via its flatcable to connector CN01 on the LCD panel, near the R-speaker; X530 is connected via its flatcable to connector CN04 on the LCD panel, near the L-speaker).
2. Remove the three fixation screws (2) from the panel.
3. Take the panel out of its brackets.

#### 4.3.8 Audio Amplifier Panel

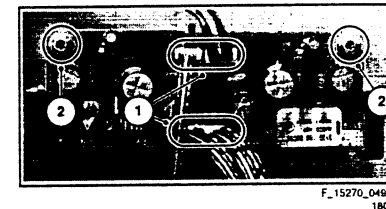
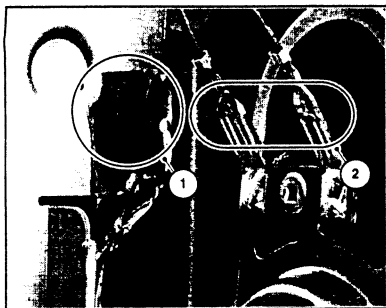


Figure 4-11 Audio amplifier panel

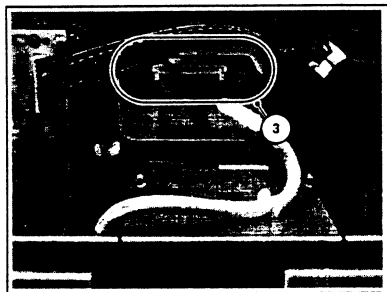
1. Disconnect all cables (1) from the panel.
2. Remove the fixation screws (2) from the panel.
3. Remove the panel.

#### 4.3.9 LCD Panel



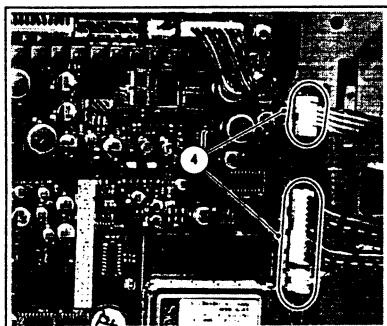
F\_15390\_047.eps  
280205

Figure 4-12 Anti-static copper foil



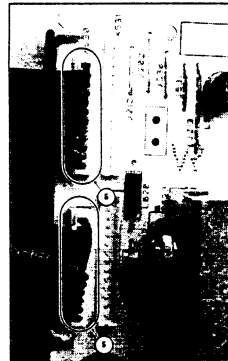
F\_15270\_051.eps  
280205

Figure 4-13 LVDS connector



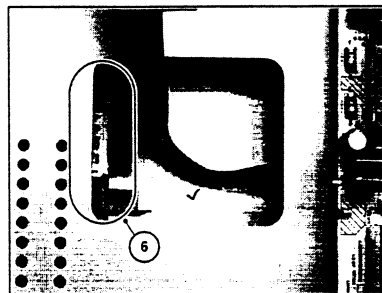
F\_15270\_052.eps  
180505

Figure 4-14 SSB board connectors for side I/O, keyboard control, and LED



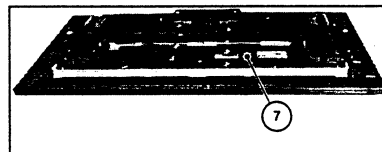
F\_15390\_061.eps  
280205

Figure 4-15 Connectors X520 and X530 on power supply panel



F\_15390\_061.eps  
280205

Figure 4-16 Connector 66B on LCD panel



F\_15390\_050.eps  
280205

Figure 4-17 LCD panel

To remove the LCD-panel, carry out the following steps:

1. Cautiously pull back the upper parts of the anti-static copper foils next to the "L" and "R" loudspeakers (see Figure "Anti-static copper foil"). Do this in such a way that the foils are no longer attached to the metal ground plate on which the SSB board is mounted.
2. Disconnect the cables (2) from the "L" and the "R" loudspeakers (see Figure "Anti-static copper foil").
3. **Important:** Unplug the LVDS connector (3) on the LCD panel (see Figure "LVDS connector").  
**Be careful,** as this is a very fragile connector!
4. Unplug the connectors (4) of the Side I/O panel, the Top Control panel, and the LED panel on the SSB board (see Figure "SSB board connectors for side I/O, keyboard control, and LED").
5. Unplug the X520 and X530 connectors (5) on the Power Supply board (see Figure "Connectors X520 and X530 on power supply panel"). Instead of X520, also connector 66B (6) on the other end of the flatcable can be unplugged (see Figure "Connector 66B on LCD panel").
6. Lift the metal frame (together with all PWBs) from the LCD panel.  
**Take care not to damage the fragile LVDS cable, the 66B connector and the anti-static copper foils near the "L" and "R" loudspeakers (take care of this too when later re-assembling the TV set and replacing the copper foil).**
7. After removal of the metal frame, you can lift the LCD display (7) from its plastic frame (see Figure "LCD panel").
8. If the plastic frame is damaged, replace it by a new frame, after removing the loudspeakers, the Side I/O panel, the Top Control panel, and the LED panel.

#### 4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

##### Notes:

- While re-assembling, make sure that all cables are placed and connected in their original positions. See Figure "Cable dressing". Also make sure that the anti-static copper foils are not damaged and that they make good electrical contact with the metal frame. Be careful with the fragile LVDS cable.

## 5. Service Modes, Error Codes, and Fault Finding

### Index of this chapter:

- 5.1 Test Points
- 5.2 Service Modes
- 5.3 Problems and Solving Tips Related to CSM
- 5.4 ComPair
- 5.5 Error Codes
- 5.6 The Blinking LED Procedure
- 5.7 Fault Finding and Repair Tips

### 5.1 Test Points

This chassis is equipped with test points in the service printing. In the schematics test points are identified with a rectangle box around Fxxx or bxxx.

Perform measurements under the following conditions:

- Television set in Service Default Alignment Mode.
- Video input: Colour bar signal.
- Audio input: 3 kHz left channel, 1 kHz right channel.

### 5.2 Service Modes

Service Default mode (SDM) and Service Alignment Mode (SAM) offers several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the call centre and the customer.

This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the possibilities of structured troubleshooting, error code reading, and software version readout for all chassis.

**Minimum requirements for ComPair:** a Pentium processor, a Windows OS, and a CD-ROM drive (see also paragraph "ComPair").

#### 5.2.1 Service Default Mode (SDM)

##### Purpose

- To create a predefined setting for measurements to be made.
- To override software protections.
- To start the blinking LED procedure.
- To inspect the error buffer.
- To check the life timer.

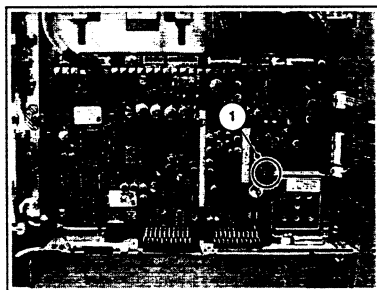
##### Specifications

- Tuning frequency: 475.25 MHz.
- Colour system: PAL-BG.
- All picture settings at 50% (brightness, colour contrast, hue).
- Bass, treble, and balance at 50 %; volume at 25 %.
- All service-unfriendly modes (if present) are disabled. The service unfriendly modes are:
  - Timer / Sleep timer.
  - Child / parental lock.
  - Blue mute.
  - Hotel / hospital mode.
  - Auto shut off (when no "IDENT" video signal is received for 15 minutes).
  - Skipping of non-favourite presets / channels.
  - Auto-storage of personal presets.
  - Auto user menu time-out.
  - Auto Volume Levelling (AVL).

##### How to Enter

To enter SDM, use one of the following methods:

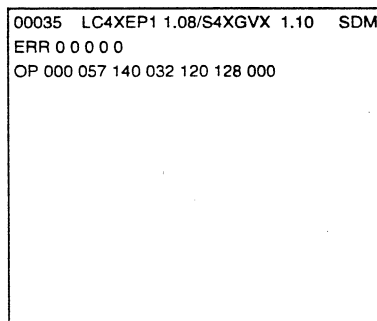
- Press the following key sequence on the remote control transmitter: "062596" directly followed by the MENU button (do not allow the display to time out between entries while keying the sequence).
- Short "Service" jumpers on the TV board during cold start and apply mains (see Figure "Service jumpers"). Then press the mains button (remove the short after start-up). **Caution:** Entering SDM by shorting "Service" jumpers will override the +8V-protection. Do this only for a short period. When doing this, the service-technician must know exactly what he is doing, as it could damage the television set.
- Or via ComPair.



F\_15270\_053.eps  
180505

Figure 5-1 Service jumpers

After entering SDM, the following screen is visible, with SDM in the upper right corner of the screen to indicate that the television is in Service Default Mode.



F\_15270\_003.eps  
1250505

Figure 5-2 SDM menu

##### How to Navigate

Use one of the following methods:

- When you press the MENU button on the remote control, the set will switch on the normal user menu in the SDM mode.
- On the TV, press and hold the VOLUME DOWN and press the CHANNEL DOWN for a few seconds, to switch from SDM to SAM and reverse.

##### How to Exit

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set. If you turn the television set off by removing the mains (i.e., unplugging the television) without using the mains button, the television set will remain in SDM when mains is re-applied, and the error buffer is not cleared.

#### 5.2.2 Service Alignment Mode (SAM)

##### Purpose

- To change option settings.
- To display / clear the error code buffer.
- To perform alignments.

##### Specifications

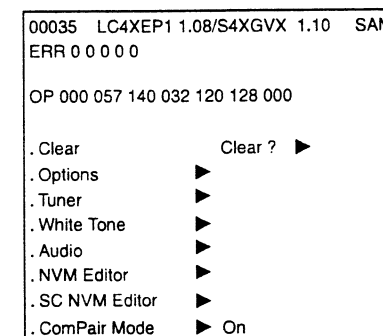
- Operation hours counter (maximum five digits displayed).
- Software version, Error codes, and Option settings display.
- Error buffer clearing.
- Option settings.
- AKB switching.
- Software alignments (Tuner, White Tone, Geometry & Audio).
- NVM Editor.
- ComPair Mode switching.

##### How to Enter

To enter SAM, use one of the following methods:

- Press the following key sequence on the remote control transmitter: "062596" directly followed by the OSD/STATUS/INFO(I-) button (do not allow the display to time out between entries while keying the sequence).
- Or via ComPair.

After entering SAM, the following screen is visible, with SAM in the upper right corner of the screen to indicate that the television is in Service Alignment Mode.



F\_15270\_004.eps  
250505

Figure 5-3 SAM menu

##### Menu Explanation

1. LLLLL. This represents the run timer. The run timer counts normal operation hours, but does not count standby hours.
2. AAABCD-X.Y. This is the software identification of the main microprocessor:
  - A= the project name (LC04.x).
  - B= the region: E= Europe, A= Asia Pacific, U= NAFTA, L= LATAM.
  - C= the software diversity:
    - Europe: T= 1 page TXT, F= Full TXT, V= Voice control.
    - LATAM and NAFTA: N= Stereo non-dBx, S= Stereo dBx.
    - Asian Pacific: T= TXT, N= non-TXT, C= NTSC.
    - ALL regions: M= mono, D= DVD, Q= Mk2.
  - D= the language cluster number.
  - X= the main software version number (updated with a major change that is incompatible with previous versions).
  - Y= the sub software version number (updated with a minor change that is compatible with previous versions).
3. EEEEE-F.GG. This is the software identification of theScaler:
  - EEEEE= the scaler sw cluster
  - F= the main sw version no.
  - GG= the sub-version no.
4. SAM. Indication of the Service Alignment Mode.
5. Error Buffer. Shows all errors detected since the last time the buffer was erased. Five errors possible.
6. Option Bytes. Used to set the option bytes. See "Options" in the Alignments section for a detailed description. Seven codes are possible.
7. Clear. Erases the contents of the error buffer. Select the CLEAR menu item and press the MENU RIGHT key. The content of the error buffer is cleared.
8. Options. Used to set the option bits. See "Options" in the Alignments section for a detailed description.
9. Tuner. Used to align the tuner. See "Tuner" in the Alignments section for a detailed description.
10. White Tone. Used to align the white tone. See "White Tone" in the Alignments section for a detailed description.
11. Audio. No audio alignment is necessary for this television set.
12. NVM Editor. Can be used to change the NVM data in the television set. See table "NVM data" further on.
13. SC NVM Editor. Can be used to edit Scaler NVM.
14. ComPair. Can be used to switch on the television to In System Programming (ISP) mode, for software uploading via ComPair.
 

**Caution:** When this mode is selected without ComPair connected, the TV will be blocked. Remove the AC power to reset the TV.

##### How to Navigate

- In SAM, select menu items with the MENU UP/DOWN keys on the remote control transmitter. The selected item will be highlighted. When not all menu items fit on the screen, use the MENU UP/DOWN keys to display the next / previous menu items.
- With the MENU LEFT/RIGHT keys, it is possible to:
  - Activate the selected menu item.
  - Change the value of the selected menu item.
  - Activate the selected submenu.
- In SAM, when you press the MENU button twice, the set will switch to the normal user menus (with the SAM mode still active in the background). To return to the SAM menu press the MENU or STATUS/EXIT button.
- When you press the MENU key in while in a submenu, you will return to the previous menu.

**How to Store SAM Settings**

To store the settings changed in SAM mode, leave the top level SAM menu by using the POWER button on the remote control transmitter or the television set.

**How to Exit**

Switch the set to STANDBY by pressing the mains button on the remote control transmitter or the television set.  
If you turn the television set "off" by removing the mains (i.e., unplugging the television) without using the mains button, the television set will remain in SAM when mains is re-applied, and the error buffer is not cleared.

8. Displays the detected Audio (e.g. stereo/mono).
9. Displays the picture setting information.
10. Displays the sound setting information.

**How to Exit**

To exit CSM, use one of the following methods:

- Press the MENU, STATUS/EXIT, or POWER button on the remote control transmitter.
- Press the POWER button on the television set.

**5.3 Problems and Solving Tips Related to CSM****5.3.1 Picture Problems**

**Note:** The problems described below are all related to the TV settings. The procedures used to change the value (or status) of the different settings are described.

**Picture too Dark or too Bright**

**If:**

- The picture improves when you press the AUTO PICTURE button on the remote control transmitter, or
- The picture improves when you enter the Customer Service Mode.

**Then:**

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys (if necessary) to select BRIGHTNESS.
6. Press the MENU LEFT/RIGHT keys to increase or decrease the BRIGHTNESS value.
7. Use the MENU UP/DOWN keys to select PICTURE.
8. Press the MENU LEFT/RIGHT keys to increase or decrease the PICTURE value.
9. Press the MENU button on the remote control transmitter twice to exit the user menu.
10. The new PERSONAL preference values are automatically stored.

**White Line around Picture Elements and Text**

**If:**

The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter.

**Then:**

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select SHARPNESS.
6. Press the MENU LEFT key to decrease the SHARPNESS value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

**Purpose**

The Customer Service Mode shows error codes and information on the TV's operation settings. The call centre can instruct the customer (by telephone) to enter CSM in order to identify the status of the set. This helps the call centre to diagnose problems and failures in the TV set before making a service call.

The CSM is a read-only mode; therefore, modifications are not possible in this mode.

**How to Enter**

To enter CSM, press the following key sequence on the remote control transmitter: "123654" (do not allow the display to time out between entries while keying the sequence).

Upon entering the Customer Service Mode, the following screen will appear:

```

1 00035 LC4XEP1.1.08/S4XGVX 1.10 CSM
2 CODES 0 0 0 0
3 OP 000 057 140 032 120 128 000
4
5
6 NOT TUNED
7 PAL
8 STEREO
9 CO 50 CL 50 BR 50
0 AVL Off
  
```

E\_15270\_005.nps  
120505

Figure 5-4 CSM menu

**Menu Explanation**

1. Indication of the decimal value of the operation hours counter, Software identification of the main microprocessor (see "Service Default or Alignment Mode" for an explanation), and the service mode (CSM = Customer Service Mode).
2. Displays the last five errors detected in the error code buffer.
3. Displays the option bytes.
4. Displays the type number version of the set.
5. Reserved item for P3C call centres (AKBS stands for Advanced Knowledge Base System).
6. Indicates the television is receiving an "IDENT" signal on the selected source. If no "IDENT" signal is detected, the display will read "NOT TUNED"
7. Displays the detected Colour system (e.g. PAL/NTSC).

**Snowy Picture**

Check CSM line 6. If this line reads "Not Tuned", check the following:

- Antenna not connected. Connect the antenna.
- No antenna signal or bad antenna signal. Connect a proper antenna signal.
- The tuner is faulty (in this case line 2, the Error Buffer line, will contain error number 10). Check the tuner and replace/repair the tuner if necessary.

**Black and White Picture**

**If:**

- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter.

**Then:**

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select COLOR.
6. Press the MENU RIGHT key to increase the COLOR value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

**Menu Text not Sharp Enough**

**If:**

- The picture improves after you have pressed the AUTO PICTURE button on the remote control transmitter.

**Then:**

1. Press the AUTO PICTURE button on the remote control transmitter repeatedly (if necessary) to choose PERSONAL picture mode.
2. Press the MENU button on the remote control transmitter. This brings up the normal user menu.
3. In the normal user menu, use the MENU UP/DOWN keys to highlight the PICTURE sub menu.
4. Press the MENU LEFT/RIGHT keys to enter the PICTURE sub menu.
5. Use the MENU UP/DOWN keys to select PICTURE.
6. Press the MENU LEFT key to decrease the PICTURE value.
7. Press the MENU button on the remote control transmitter twice to exit the user menu.
8. The new PERSONAL preference value is automatically stored.

**5.4 ComPair****5.4.1 Introduction**

ComPair (Computer Aided Repair) is a service tool for Philips Consumer Electronics products. ComPair is a further development on the European DST (service remote control), which allows faster and more accurate diagnostics. ComPair has three big advantages:

- ComPair helps you to quickly get an understanding on how to repair the chassis in a short time by guiding you systematically through the repair procedures.
- ComPair allows very detailed diagnostics (on I<sup>2</sup>C level) and is therefore capable of accurately indicating problem areas. You do not have to know anything about I<sup>2</sup>C commands yourself because ComPair takes care of this.

**5.4.2 Specifications**

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair interface box is connected to the PC via a serial (or RS-232) cable.

For this chassis, the ComPair interface box and the TV communicate via a bi-directional service cable via the service connector(s).

The ComPair fault finding program is able to determine the problem of the defective television. ComPair can gather diagnostic information in two ways:

- Automatic (by communication with the television): ComPair can automatically read out the contents of the entire error buffer. Diagnosis is done on I<sup>2</sup>C/UART level. ComPair can access the I<sup>2</sup>C/UART bus of the television. ComPair can send and receive I<sup>2</sup>C/UART commands to the micro controller of the television. In this way, it is possible for ComPair to communicate (read and write) to devices on the I<sup>2</sup>C/UART buses of the TV-set.
- Manually (by asking questions to you): Automatic diagnosis is only possible if the micro controller of the television is working correctly and only to a certain extend. When this is not the case, ComPair will guide you through the fault finding tree by asking you questions (e.g. Does the screen give a picture? Click on the correct answer: YES / NO) and showing you examples (e.g. Measure test-point 17 and click on the correct oscillogram you see on the oscilloscope). You can answer by clicking on a link (e.g. text or a waveform picture) that will bring you to the next step in the fault finding process.

By a combination of automatic diagnostics and an interactive question / answer procedure, ComPair will enable you to find most problems in a fast and effective way.

**5.4.3 How to Connect**

This is described in the chassis fault finding database in ComPair.

**CAUTION:** It is compulsory to connect the TV to the PC as shown in the picture below (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

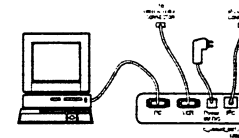


Figure 5-5 ComPair interface connection

**5.4.4 How to Order**

ComPair order codes (EU/AP/LATAM):

- Starter kit ComPair32/SearchMan32 software and ComPair interface (excl. transformer): 3122 785 90450.
- ComPair interface (excl. transformer): 4822 727 21631.

- Starter kit ComPair32 software (registration version): 3122 785 60040.
- Starter kit SearchMan32 software: 3122 785 60050.
- ComPair32 CD (update): 3122 785 60070 (year 2002), 3122 785 60110 (year 2003 onwards).
- SearchMan32 CD (update): 3122 785 60080 (year 2002), 3122 785 60120 (year 2003), 3122 785 60130 (year 2004).
- ComPair firmware upgrade IC: 3122 785 90510.
- Transformer (non-UK): 4822 727 21632.
- Transformer UK: 4822 727 21633.
- ComPair interface cable: 3122 785 90004.
- ComPair interface extension cable: 3139 131 03791.
- ComPair UART interface cable: 3122 785 90630.

**Note:** If you encounter any problems, contact your local support desk.

## 5.5 Error Codes

The error code buffer contains all errors detected since the last time the buffer was erased. The buffer is written from left to right. When an error occurs that is not yet in the error code buffer, it is displayed at the left side and all other errors shift one position to the right.

### 5.5.1 How to Read the Error Buffer

You can read the error buffer in 3 ways:

- On screen via the SAM (if you have a picture).  
**Examples:**
  - ERROR: 0 0 0 0 0 : No errors detected
  - ERROR: 6 0 0 0 0 : Error code 6 is the last and only detected error
  - ERROR: 9 6 0 0 0 : Error code 6 was detected first and error code 9 is the last detected (newest) error
- Via the blinking LED procedure (when you have no picture). See "The Blinking LED Procedure".
- Via ComPair.

### 5.5.2 How to Clear the Error Buffer

The error code buffer is cleared in the following cases:

- By using the CLEAR command in the SAM menu:
  - To enter SAM, press the following key sequence on the remote control transmitter: "062596" directly followed by the OSD/STATUS button (do not allow the display to time out between entries while keying the sequence).
  - Make sure the menu item CLEAR is highlighted. Use the MENU UP/DOWN buttons, if necessary.
  - Press the MENU RIGHT button to clear the error buffer. The text on the right side of the "CLEAR" line will change from "CLEAR?" to "CLEARED"
- If the contents of the error buffer have not changed for 50 hours, the error buffer resets automatically.

**Note:** If you exit SAM by disconnecting the mains from the television set, the error buffer is not reset.

### 5.5.3 Error Codes

In case of non-intermittent faults, write down the errors present in the error buffer and clear the error buffer before you begin the repair. This ensures that old error codes are no longer present.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error and not the actual cause of the problem (for example, a fault in the protection detection circuitry can also lead to a protection).

Table 5-1 Error code overview

| Error | Device                                      | Error Description                                                                                                                                                                        | Check Item                                  | Diagram                                     |
|-------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------|
| 0     | Not applicable                              | No Error                                                                                                                                                                                 | -                                           | -                                           |
| 1     | Not applicable                              | Mis-match of TV Hercules SW and Scaler SW                                                                                                                                                | -                                           | -                                           |
| 2     | Not applicable                              | -                                                                                                                                                                                        | -                                           | -                                           |
| 3     | Not applicable                              | -                                                                                                                                                                                        | -                                           | -                                           |
| 4     | Genesis Scaler<br>Flash-ROM                 | I <sup>2</sup> C error while communicating with the Genesis Scaler and/or Flash-ROM is faulty/empty                                                                                      | 7801<br>7B01                                | B7 + B8<br>B10                              |
| 5     | Scaler supply<br>7752                       | +5V protection                                                                                                                                                                           | 7752                                        | B6                                          |
| 6     | Not applicable                              | General I <sup>2</sup> C error                                                                                                                                                           | 1102, 7L04, 7M00                            | B1 + B18<br>+ B19                           |
| 7     | ADC                                         | I <sup>2</sup> C error                                                                                                                                                                   | 7L04                                        | B18                                         |
| 8     | Scaler EEPROM                               | I <sup>2</sup> C error while communicating with the Scaler EEPROM                                                                                                                        | 7C01                                        | B11                                         |
| 9     | Hercules<br>EEPROM                          | I <sup>2</sup> C error while communicating with the Hercules EEPROM (NVM for TV).<br>Remark: when the Hercules EEPROM is defective, the Hercules should operate with its default values. | 7207                                        | B2                                          |
| 10    | Tuner                                       | I <sup>2</sup> C error while communicating with the PLL tuner                                                                                                                            | 1102, F102, F104, F107                      | B1                                          |
| 11    | Columbus                                    | I <sup>2</sup> C error while communicating with the 2D/3D combFilter Columbus                                                                                                            | 7M00                                        | B19                                         |
| 12    | Not applicable                              | -                                                                                                                                                                                        | -                                           | -                                           |
| 13    | HDMI Panellink<br>Receiver/<br>Decoder      | I <sup>2</sup> C error while communicating with the iBoard HDMI Panellink Receiver/Decoder (only in NA-1A and AP sets)                                                                   | 7D03                                        | B12<br>(only in<br>NAFTA<br>and AP<br>sets) |
| 14    | Scaler SDRAM                                | Read-write error with the Scaler SDRAM                                                                                                                                                   | 7B01                                        | B10                                         |
| 15    | Not applicable                              | -                                                                                                                                                                                        | -                                           | -                                           |
| 16    | EPLD                                        | I <sup>2</sup> C error while communicating with EPI D                                                                                                                                    | 7N02                                        | B20 +<br>B21                                |
| 17    | Digital Module<br>(only on Digital<br>sets) | I <sup>2</sup> C error while communicating with the Digital Module (only on Digital sets)                                                                                                | Digital Module<br>(only on Digital<br>sets) |                                             |
| 18    | Not applicable                              | -                                                                                                                                                                                        | -                                           | -                                           |

## 5.6 The Blinking LED Procedure

Using this procedure, you can make the contents of the error buffer visible via the front LED. This is especially useful when there is no picture.

When the SDM is entered, the front LED will blink the contents of the error-buffer:

- The LED blinks with as many pulses as the error code number, followed by a time period of 1.5 seconds, in which the LED is off.
- Then this sequence is repeated.

Any RC5 command terminates this sequence.

**Example of error buffer: 12 9 6 0 0**

After entering SDM, the following occurs:

- 1 long blink of 5 seconds to start the sequence,
- 12 short blinks followed by a pause of 1.5 seconds,
- 9 short blinks followed by a pause of 1.5 seconds,
- 6 short blinks followed by a pause of 1.5 seconds,
- 1 long blink of 1.5 seconds to finish the sequence,
- The sequence starts again with 12 short blinks.

## 5.7 Fault Finding and Repair Tips

**Notes:**

- It is assumed that the components are mounted correctly with correct values and no bad solder joints.
- Before any fault finding actions, check if the correct options are set.

### 5.7.1 NVM Editor

In some cases, it can be handy if one directly can change the NVM contents. This can be done with the "NVM Editor" in SAM mode. With this option, single bytes can be changed.

**Caution:**

- Do not change the NVM settings without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!
- Do not change the Scaler NVM settings, as this will hamper the DVI functionality of the TV set!
- Always note down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

Table 5-2 NVM editor overview

|        | Hex    | Dec | Description    |
|--------|--------|-----|----------------|
| .ADR   | 0x000A | 10  | Existing value |
| .VAL   | 0x0000 | 0   | New value      |
| .Store |        |     | Store?         |

Table 5-3 NVM Default values (option bit settings through NVM Editor in SAM Mode)

| Byte Nr.           | Bit              | Feature/Mode       | Description                                | 32PF7320/10 | 32PF5320/10 | 26PF5320/10 | 26PF4310/10 |
|--------------------|------------------|--------------------|--------------------------------------------|-------------|-------------|-------------|-------------|
| Byte 0<br>174(dec) | 0                | QSS (LSB)          | Mode of quasi split sound amplifier        | 1           | 1           | 1           | 1           |
|                    | 1                | FMI                | Connection of output of QSS amplifier      | 1           | 1           | 1           | 1           |
|                    | 2                | HCO                | EHT tracking mode                          | 0           | 0           | 0           | 0           |
|                    | 3                | HP2                | Synchronization of OSD/Text display        | 1           | 1           | 1           | 1           |
|                    | 4                | FSL                | Forced slicing level for vertical sync     | 1           | 1           | 1           | 1           |
|                    | 5                | TFR                | DC transfer ratio of luminance signal      | 1           | 1           | 1           | 1           |
|                    | 6                | OSVE               | Black current measuring in overscan        | 0           | 0           | 0           | 0           |
|                    | 7                | MVK (MSB)          | (For Future Usage, as defined by software) | 0           | 0           | 0           | 0           |
|                    | Total Dec Values |                    |                                            | 59          | 59          | 59          | 59          |
|                    | Total Hex Values |                    |                                            | 3B          | 3B          | 3B          | 3B          |
| Byte 1<br>175(dec) | 0                | PSE                | PSE                                        | 0           | 0           | 0           | 0           |
|                    | 1                | OPC                | OPC                                        | 0           | 0           | 0           | 0           |
|                    | 2                | PRIS               | PRIS                                       | 0           | 0           | 0           | 0           |
|                    | 3                | CONTINUOUS FACTORY | Continuous factory mode                    | 0           | 0           | 0           | 0           |
|                    | 4                | WHITE PATTERN ON   | Last color pattern status in factory mode  | 0           | 0           | 0           | 0           |
|                    | 5                | SDM MODE           | Service default mode on/off                | 0           | 0           | 0           | 0           |
|                    | 6                | SAM MODE           | Service Align mode on/off                  | 0           | 0           | 0           | 0           |
|                    | 7                | SVMA               | Scavm On / Off                             | 0           | 0           | 0           | 0           |
|                    | Total Dec Values |                    |                                            | 0           | 0           | 0           | 0           |
|                    | Total Hex Values |                    |                                            | 00          | 00          | 00          | 00          |
| Byte 2<br>176(dec) | 0                | MUTE STATUS        | Mute status                                | 0           | 0           | 0           | 0           |
|                    | 1                | TUNER AUTO MODE    | Auto mode                                  | 1           | 1           | 1           | 1           |
|                    | 2                | CABLE MODE         | Cable/Antenna mode                         | 0           | 0           | 0           | 0           |
|                    | 3                | LAST POWER MODE    | Last power status of the set               | 1           | 1           | 1           | 1           |
|                    | 4                | CHILD LOCK MODE    | Child lock enabled                         | 0           | 0           | 0           | 0           |
|                    | 5                | SURF MODE          | Surf mode on/off                           | 0           | 0           | 0           | 0           |
|                    | 6                | FACTORY MODE       | Factory mode on                            | 0           | 0           | 0           | 0           |
|                    | 7                | PSNS               | For PAL color enhancement in ES4           | 1           | 1           | 1           | 1           |
|                    | Total Dec Values |                    |                                            | 138         | 138         | 138         | 138         |
|                    | Total Hex Values |                    |                                            | 8A          | 8A          | 8A          | 8A          |
| Byte 3<br>177(dec) | 0                | RADIO/TV MODE      | Radio mode or TV mode                      | 0           | 0           | 0           | 0           |
|                    | 1                | WAKE-UP MODE       | WAKE-UP MODE                               | 0           | 0           | 0           | 0           |
|                    | 2                | HOTEL MODE         | TV in Hotel mode                           | 0           | 0           | 0           | 0           |
|                    | 3                | HOTEL KBD LOCK     | Keyboard locked                            | 0           | 0           | 0           | 0           |
|                    | 4                | HBL                | HBL                                        | 0           | 0           | 0           | 0           |
|                    | 5                | BLS                | Blue stretch mode                          | 1           | 1           | 1           | 1           |
|                    | 6                | SL                 | SL                                         | 0           | 0           | 0           | 0           |
|                    | 7                | CFA0               | Comb filter On/Off                         | 0           | 0           | 0           | 0           |
|                    | Total Dec Values |                    |                                            | 32          | 32          | 32          | 32          |
|                    | Total Hex Values |                    |                                            | 20          | 20          | 20          | 20          |
| Byte 4<br>178(dec) | 0                | Signal Strength    | Signal Strength Switch in MK2              | 0           | 0           | 0           | 0           |
|                    | 1                | LPG                | LPG                                        | 0           | 0           | 0           | 0           |
|                    | 2                | DVD TRAY LOCK      | Lock/Unlock DVD tray                       | 0           | 0           | 0           | 0           |
|                    | 3                | SCRSAVER MODE      | Screen saver mode                          | 1           | 1           | 1           | 1           |
|                    | 4                | BKS                | Black Stretch Mode                         | 1           | 1           | 1           | 1           |
|                    | 5                | BSD                | Black Stretch Depth                        | 1           | 1           | 1           | 0           |
|                    | 6                | CRA0               | Coring on SVM                              | 1           | 1           | 1           | 1           |
|                    | 7                | PIP QSS            | PIP QSS                                    | 0           | 0           | 0           | 0           |
|                    | Total Dec Values |                    |                                            | 120         | 120         | 120         | 88          |
|                    | Total Hex Values |                    |                                            | 78          | 78          | 78          | 58          |

| Byte Nr.           | Bit              | Feature/Mode         | Description                               | 32PF7320/10 | 32PF5320/10 | 26PF5320/10 | 26PF4310/10 |
|--------------------|------------------|----------------------|-------------------------------------------|-------------|-------------|-------------|-------------|
| Byte 5<br>179(dec) | 0                | FFI                  | Fast Filter                               | 0           | 0           | 0           | 0           |
|                    | 1                | NNR                  | No red reduction during blue stretch      | 1           | 1           | 1           | 1           |
|                    | 2                | MUS                  | NTSC matrix                               | 1           | 1           | 1           | 1           |
|                    | 3                | GAM                  | Gamma control                             | 1           | 1           | 1           | 1           |
|                    | 4                | CBS                  | Control sequence of beam current limiting | 0           | 0           | 0           | 0           |
|                    | 5                | LLB                  | Low level of beam current limiter         | 0           | 0           | 0           | 0           |
|                    | 6                | DSA                  | Dynamic skin tone angle area              | 1           | 1           | 1           | 0           |
|                    | 7                | DSK                  | Dynamic skin tone angle on/ off           | 0           | 0           | 0           | 1           |
|                    | Total Dec Values |                      |                                           | 78          | 78          | 78          | 142         |
|                    | Total Hex Values |                      |                                           | 4E          | 4E          | 4E          | 8E          |
| Byte 6<br>180(dec) | 0                | LTI status           | LTI last status                           | 0           | 0           | 0           | 0           |
|                    | 1                | Inc_Life_Time        | Inc_Life_Time                             | 0           | 0           | 0           | 0           |
|                    | 2                | PC_Mode              | PC_Mode                                   | 0           | 0           | 0           | 0           |
|                    | 3                | HD_Mode              | HD_Mode                                   | 0           | 0           | 0           | 0           |
|                    | 4                | Tact_Switch          | Tact_Switch                               | 0           | 0           | 0           | 0           |
|                    | 5                | Set_In_Special_Stby  | Set_In_Special_Stby                       | 0           | 0           | 0           | 0           |
|                    | 6                | Hotel_OSDDisplay     | Hotel_OSDDisplay                          | 0           | 0           | 0           | 0           |
|                    | 7                | Hotel_MonitorOut     | Hotel_MonitorOut                          | 0           | 0           | 0           | 0           |
|                    | Total Dec Values |                      |                                           | 0           | 0           | 0           | 0           |
|                    | Total Hex Values |                      |                                           | 00          | 00          | 00          | 00          |
| Byte 7<br>181(dec) | 0                | Hotel_IconMode       | Hotel_IconMode                            | 0           | 0           | 0           | 0           |
|                    | 1                | DBE                  | DBE                                       | 1           | 1           | 1           | 1           |
|                    | 2                | SD                   | SD                                        | 0           | 0           | 0           | 0           |
|                    | 3                | Set_in_PC_Sleep_Mode | Set_in_PC_Sleep_Mode                      | 0           | 0           | 0           | 0           |
|                    | 4                | Reserved             | Reserved                                  | 0           | 0           | 0           | 0           |
|                    | 5                | Reserved             | Reserved                                  | 0           | 0           | 0           | 0           |
|                    | 6                | Reserved             | Reserved                                  | 0           | 0           | 0           | 0           |
|                    | 7                | Reserved             | Reserved                                  | 0           | 0           | 0           | 0           |
|                    | Total Dec Values |                      |                                           | 2           | 2           | 2           | 2           |
|                    | Total Hex Values |                      |                                           | 02          | 02          | 02          | 02          |

## 5.7.2 Load Default NVM Values

In case a blank NVM is placed or when the NVM content is corrupted, default values can be downloaded into the NVM. (For empty NVM replacement, short the SDM with a jumper and apply the mains voltage. Remember to remove the jumper after the reload is completed). After the default values are downloaded, it will be possible to start up and to start aligning the TV set. This is no longer initiated automatically; to initiate the download the following action has to be performed:

1. Switch "off" the TV set by disconnecting the AC Power plug.
2. Short circuit the SDM jumpers (keep short-circuited).
3. Press P+ or Ch+ on the local keyboard (and keep it pressed).
4. Switch on the TV set via the AC Power plug.
5. Keep pressing the P+/Ch+ button until the set has started up and the SDM is shown.

## Alternative method:

1. Go to SAM.
2. Select NVM Editor (not SC NVM Editor).
3. Select ADR (address) to 1 (dec).
4. Change the VAL (value) to 170 (dec).
5. Store the value.
6. Disconnect the mains plug and wait for a few seconds.
7. Reconnect the mains plug and wait until the set goes into its standby mode (red LED lights up).
8. Restart the set.

## 5.7.3 Tuner and IF

**No Picture in RF Mode, but there is a Noise Raster**

1. Check whether picture is present in AV. If not, go to Video processing troubleshooting section.
2. If present, check if the Option settings are correct.
3. Check if all the supply voltages are present (3.3/5/8/12/33 V).
4. Check if the I<sup>2</sup>C lines are working correctly (3.3 V).
5. Manually store a known channel and check if there is IF output at Tuner pin 11.
6. Check the tuning DC voltage at pin 2 of the Tuner. The DC voltage should vary according to the frequency/channel being chosen.
7. If the tuning voltage is OK, check the tuner output, pin 11.
8. If it has no output, the Tuner may have a defect. Change the Tuner.

**Sound in Picture Problem for L' System (rolling horizontal lines)**

1. Check whether AGC L' in SAM mode is set to 0.
2. If yes, align the set to correct value.

**Required System is not Selected Correctly**

Check whether a Service jumper (#4204 & 4205, 0805 size) is present. If yes, remove it.



## 5.7.4 Video Processing

**No Power**

1. Check +12 V and 3V3 at position 1J02.
2. If no supply, check the connector 1J02.
3. If it is correct, check the power supply board.

**Power Supply is Correct, but no Green LED**

1. Check if the connectors 1K00 are properly inserted.
2. If they are inserted correctly, check if the 3V3 is present.

**No Picture Display (blank screen with correct sound output)**

1. Check whether the user menu is visible.
2. If the user menu is OK, activate teletext mode.
3. If teletext is OK, the problem is in the ADC (B18) & Columbus 3D combfilter (B19), if present (depending on model, see also paragraph "Teletext Path" in chapter 9).
4. If the user menu is not visible, check if the LCD panel backlight is ON.
5. If the backlight is OFF, the problem is in the power supply board or LCD panel. Also check pin 12 (LAMP\_ON\_OFF) of 1J02. It should be HIGH during normal operation.

**Note:** For faultfinding purposes, it is important to know the following: in Pixel Plus and Digital Crystal Clear models, which have an ADC (B18) and Columbus 3D combfilter (B19), the digital input of the scaler is used for the digital video path (Hercules output), whereas the analogue RGB input (analogue input of the scaler) is only used for teletext. This means that no mixed mode (video plus teletext simultaneously) is possible. If there is sound and teletext, but no video and user menu (blank screen), the digital path (Hercules - ADC - Columbus - Scaler) is faulty. If there is sound but no teletext, the back-end part (Scaler - LCD panel) is faulty. In Crystal Clear models, which do not have an ADC and Columbus, the RGB path (analogue input of scaler) is used for both video and teletext.

**No TV, but PC is Present**

1. Check if Hsync\_SDTV and Vsync\_SDTV are present at pin 1 & pin13 of 7E03.
2. If they are present, check teletext output.
3. If there is no teletext output, the IC TDA150xx may be defect.

## 5.7.5 Power Supply

**Check Fuse**

The power supply (various models are used) contains one fuse near the AC input connector X002.

1. Check with power supply in "off" state by means of ohmic measurement.
2. Fuse X102 may open in case of severe lightning strikes and/or failures in the power supply.
3. Check the standby signal at pin 10 of X200. ON is HIGH, OFF is LOW. During standby mode only the 3V3 is present at pin 10.

**Protections Concept on Power Supply Board (two models)**

1. **12 V output (pin 8 of X200):** Short-circuit protected by 2.5 A fuse X610. Over-voltage protection when output voltage is more than 40% above nominal value.
2. **Vaudio output (+18 or +24 V, depending on power supply model used); (pin 1 of X200):** Short-circuit proof (+18 V version has 2.5 A fuse X660). Over voltage protection when output voltage is more than 40% above nominal value.
3. **3V3STBY output (pin 3&4 of X200):** Short-circuit proof with auto-restart. Over voltage protection when output voltage is more than 40% above nominal value.

4. **24 V output (for inverter X520 & X530):** Short-circuit proof with auto-restart. Over voltage protection when output voltage is more than 40% above nominal value.

**Standby Mode**

1. Apply a 12 ohm load resistor of sufficient power rating to all outputs mentioned above (+12 V, +18/24 V, +3V3 and +24 V). Connect the STBY pin (pin 10 of X200) to logical "L" (low), i.e. to GND.
2. Over an input voltage range of 90 V<sub>AC</sub> to 276 V<sub>AC</sub> only the +3V3 STBY output shall be up.

**Normal Mode:**

1. Apply a 12 ohm load resistor of sufficient power rating to all outputs mentioned above (+12 V, +18/24 V, +3V3 and +24 V). Connect the STBY pin (pin 10 of X200) to logical "H" (high), i.e. to the +3V3 STBY output via a 2,2 k pull up resistor.
2. Over an input voltage range of 90 V<sub>AC</sub> to 276 V<sub>AC</sub> all outputs shall be up. The voltage on the +3V3 STBY output shall be 3.3 V over the entire input voltage range. The voltage on the big 400 V capacitor on the power supply should also be 400 V ±10%.

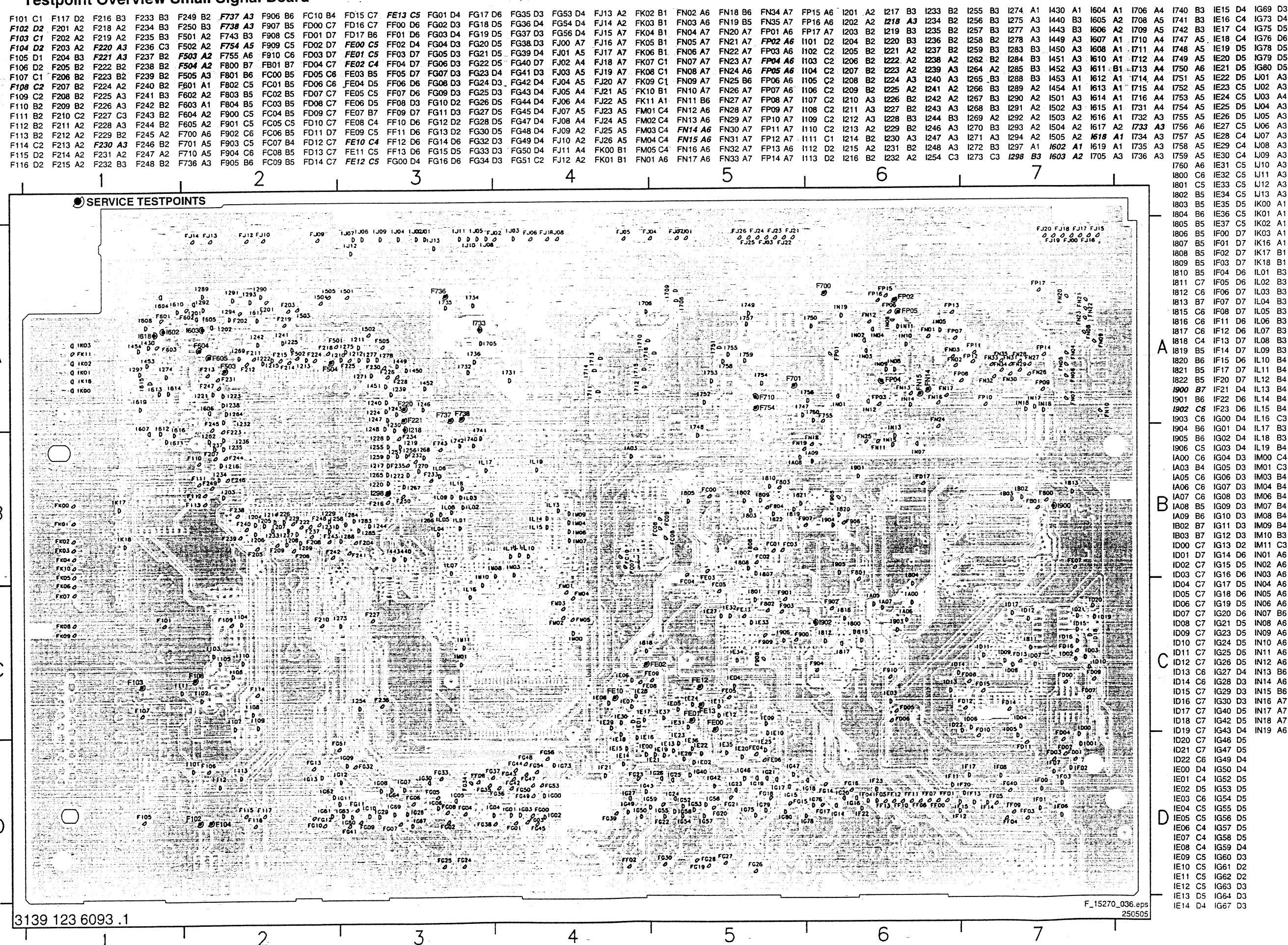
### Wiring Diagram



F\_15270\_039.eps  
250505

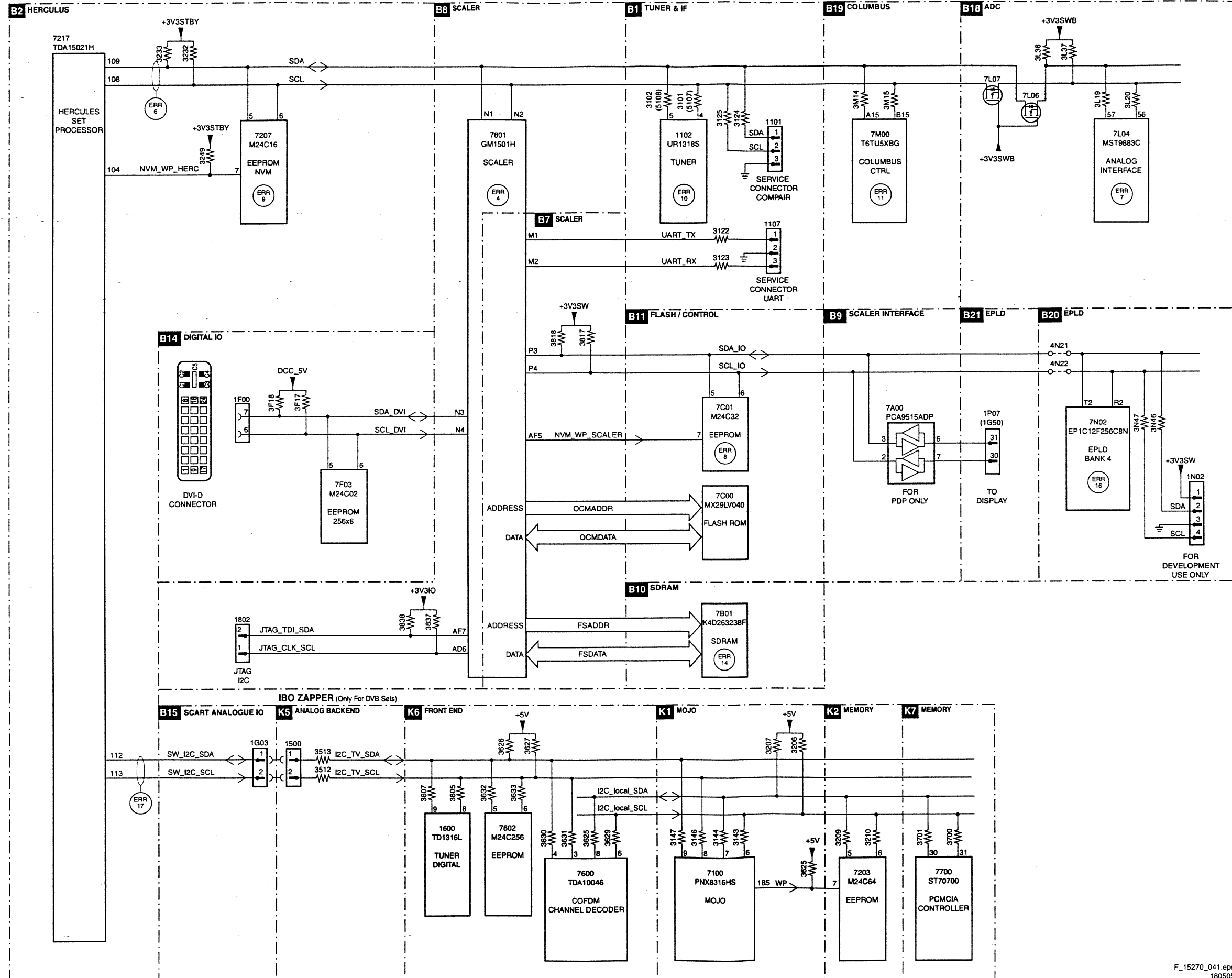


## Testpoint Overview Small Signal Board



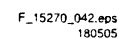
## I2C IC Overview

IIC



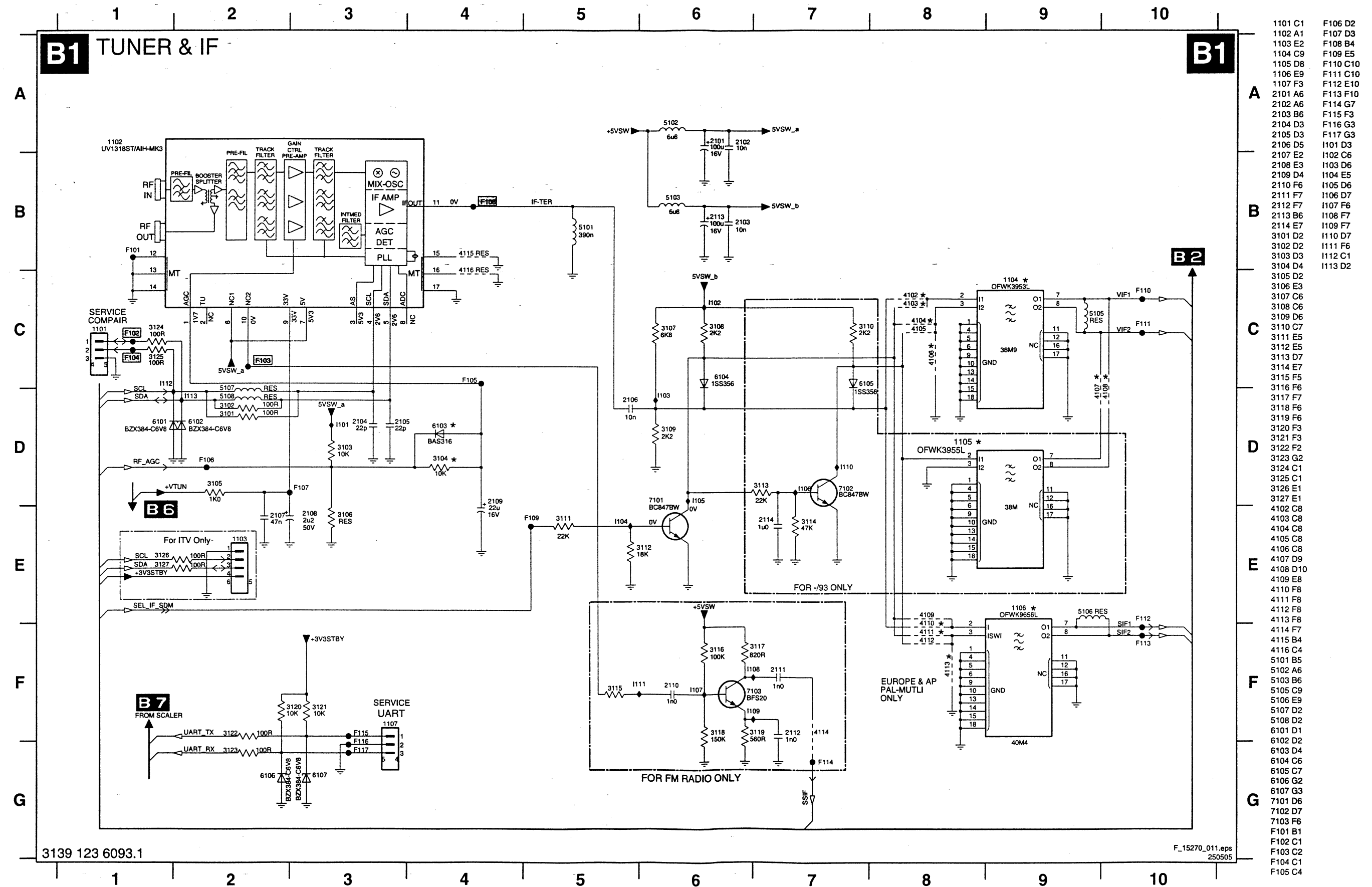


## SUPPLY LINE OVERVIEW



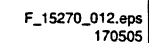
## 7. Circuit Diagrams and PWB Layouts

SSB: Tuner and VIF



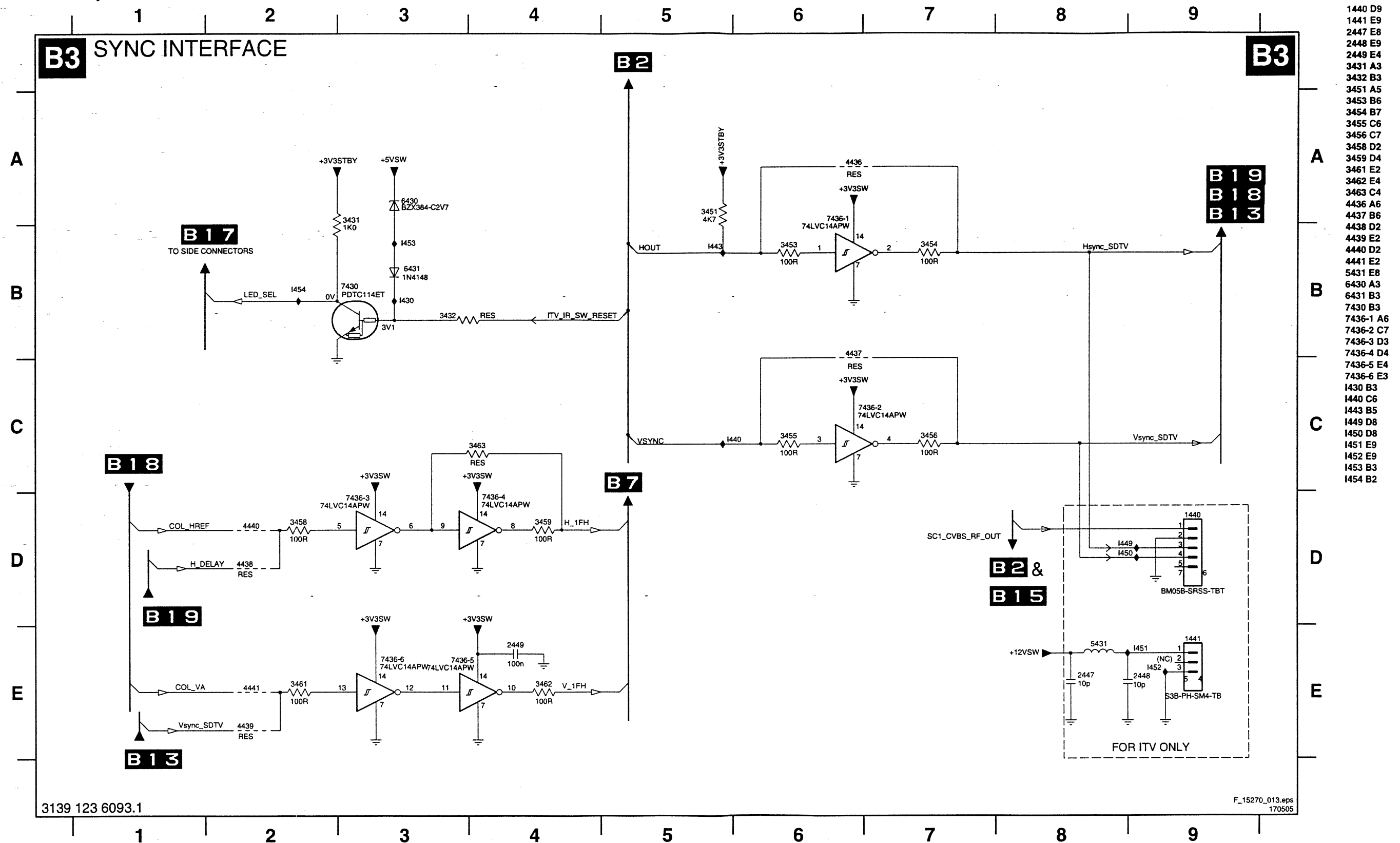


# B2 HERCULES

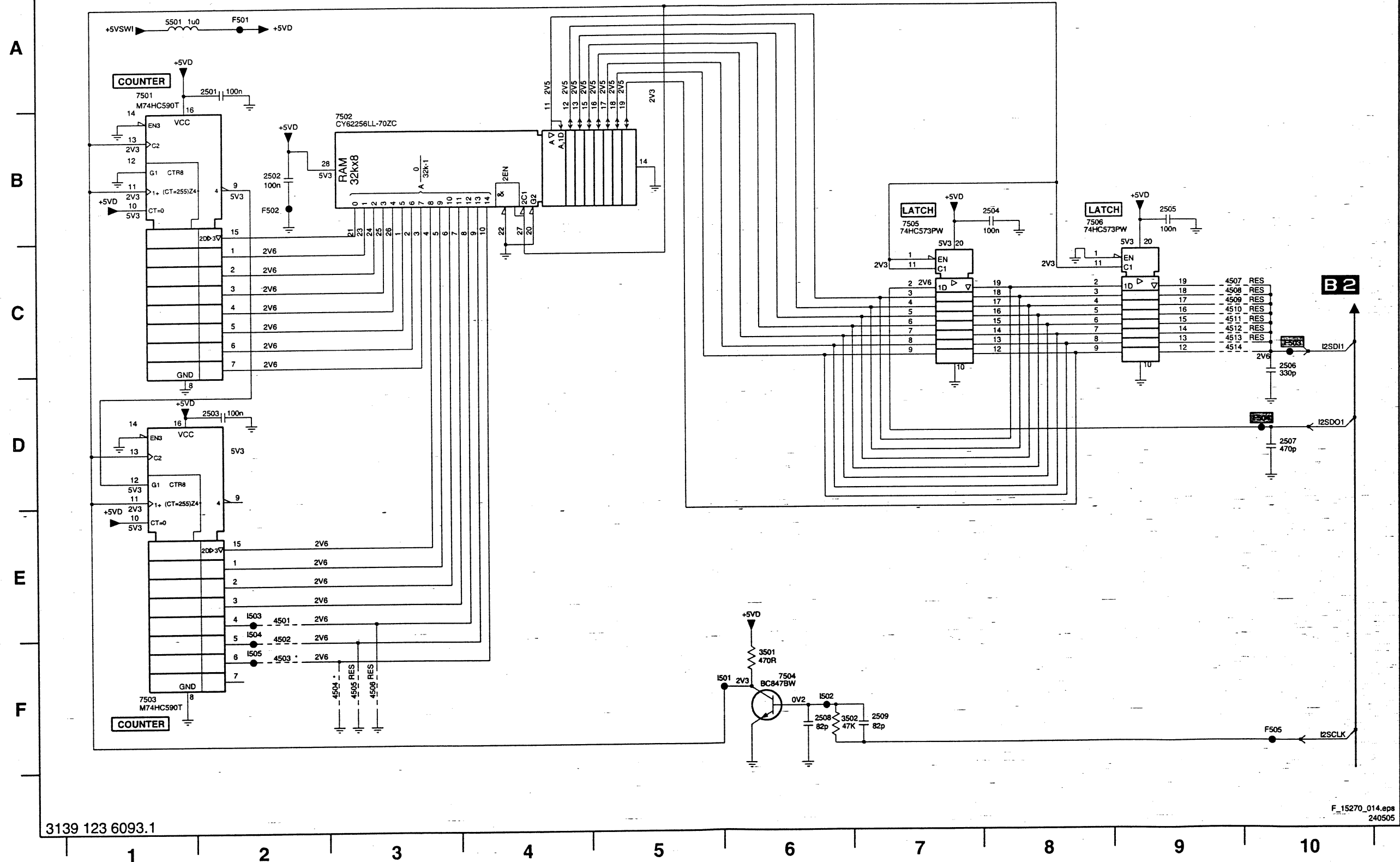


|          |          |           |          |
|----------|----------|-----------|----------|
| 1201 B7  | 3215 B6  | 5209 D5   | 1216 C10 |
| 1202 G10 | 3216 A6  | 5210 D5   | 1217 C11 |
| 1203 A1  | 3217 B7  | 5211 E5   | 1218 D3  |
| 1202 B3  | 3218 B7  | 5212 E5   | 1219 C5  |
| 1203 D2  | 3219 B7  | 5213 E5   | 1220 D5  |
| 1205 G4  | 3220 B7  | 5214 G9   | 1221 D5  |
| 1206 G4  | 3222 B8  | 5215 F10  | 1222 D5  |
| 1207 F5  | 3223 B8  | 5216 F10  | 1223 D5  |
| 1208 G4  | 3224 B8  | 5217 H7   | 1224 E5  |
| 1209 G4  | 3225 B8  | 5218 F2   | 1225 C10 |
| 1210 B5  | 3226 B9  | 6201 E4   | 1226 F8  |
| 1211 B6  | 3227 C8  | 6204 C11  | 1227 F6  |
| 1214 B6  | 3228 D2  | 6205 C11  | 1228 F7  |
| 1216 B6  | 3229 C9  | 6206 C12  | 1229 F7  |
| 1218 A7  | 3230 B9  | 7201-1 B1 | 1230 F7  |
| 1219 A7  | 3231 B9  | 7201-2 C2 | 1231 F7  |
| 1220 B7  | 3232 B9  | 7202-1 C2 | 1232 F8  |
| 1221 A7  | 3233 B9  | 7202-2 C3 | 1233 F8  |
| 1223 B8  | 3234 B9  | 7203-1 C3 | 1234 F8  |
| 1224 C8  | 3235 B9  | 7203-2 C3 | 1235 F8  |
| 1225 B10 | 3236 B9  | 7204-1 A4 | 1236 F8  |
| 1226 C10 | 3237 C9  | 7204-2 C4 | 1237 F8  |
| 1227 B11 | 3238 C10 | 7205-1 B4 | 1238 F9  |
| 1228 C5  | 3239 C10 | 7205-2 B4 | 1239 F9  |
| 1229 C5  | 3240 B10 | 7206 B6   | 1240 F10 |
| 1230 D5  | 3241 B10 | 7207 B11  | 1241 B10 |
| 1231 D5  | 3242 C10 | 7208 D2   | 1242 F4  |
| 1232 D5  | 3243 C10 | 7209 D2   | 1243 C4  |
| 1233 D5  | 3244 D2  | 7210 D3   | 1244 B7  |
| 1234 D4  | 3245 C10 | 7211 F4   | 1246 D2  |
| 1235 D4  | 3246 C11 | 7214 G3   | 1247 D4  |
| 1236 D5  | 3247 B11 | 7215 G4   | 1248 D4  |
| 1237 D5  | 3248 B11 | 7216-1 G3 | 1254 F6  |
| 1238 E5  | 3249 A11 | 7216-2 G3 | 1255 F6  |
| 1239 E5  | 3250 D2  | 7217 C6   | 1256 E7  |
| 1240 E5  | 3251 D3  | 7218 F11  | 1257 E7  |
| 1241 E5  | 3252 D3  | 7219 F2   | 1258 E7  |
| 1242 E5  | 3253 D3  | 7201 B2   | 1259 F8  |
| 1243 E5  | 3254 F3  | 7202 B2   | 1262 F8  |
| 1244 E5  | 3255 E2  | 7203 B3   | 1264 F9  |
| 1245 E5  | 3256 E2  | 7204 B3   | 1265 F10 |
| 1246 F5  | 3257 E3  | 7205 B6   | 1266 F10 |
| 1247 F6  | 3258 E2  | 7206 B6   | 1267 F11 |
| 1248 G6  | 3259 E2  | 7207 C7   | 1268 G11 |
| 1249 G6  | 3260 E3  | 7208 C7   | 1269 C11 |
| 1250 F7  | 3262 F3  | 7209 B7   | 1270 B11 |
| 1251 F7  | 3263 F3  | 7210 F1   | 1271 B10 |
| 1252 F7  | 3264 F4  | 7211 C9   | 1272 B10 |
| 1253 F7  | 3265 F4  | 7212 C8   | 1273 C9  |
| 1254 F7  | 3266 F4  | 7213 C10  | 1274 A9  |
| 1255 F7  | 3267 F4  | 7214 C10  | 1275 A9  |
| 1256 F8  | 3268 F5  | 7215 C10  | 1277 C8  |
| 1257 F8  | 3270 F7  | 7216 C10  | 1278 C8  |
| 1258 G5  | 3271 F7  | 7218 A11  | 1283 B6  |
| 1259 G8  | 3272 F8  | 7219 B12  | 1284 B6  |
| 1260 F8  | 3273 F8  | 7220 D3   | 1285 B6  |
| 1262 G8  | 3274 F8  | 7221 D3   | 1288 B6  |
| 1263 F8  | 3275 F9  | 7222 D5   | 1289 A3  |
| 1264 G8  | 3276 F9  | 7223 D5   | 1290 A3  |
| 1265 G8  | 3277 F10 | 7224 D5   | 1291 A4  |
| 1266 G8  | 3278 F11 | 7225 D5   | 1292 B3  |
| 1267 F8  | 3279 G11 | 7226 D5   | 1293 B3  |
| 1268 G8  | 3282 F4  | 7227 D4   | 1294 B3  |
| 1269 F8  | 3281 F8  | 7228 E5   | 1297 B8  |
| 1270 F9  | 3282 F3  | 7229 E5   | 1298 C7  |
| 1271 F9  | 3283 B8  | 7230 G4   |          |
| 1272 F9  | 3284 B8  | 7231 G4   |          |
| 1273 F10 | 3285 G6  | 7232 F5   |          |
| 1274 F10 | 3286 H6  | 7233 F5   |          |
| 1275 G9  | 3287 B7  | 7234 F5   |          |
| 1276 G10 | 3288 B7  | 7235 F5   |          |
| 1277 F10 | 3289 D2  | 7236 F6   |          |
| 1279 F11 | 3291 F2  | 7238 F6   |          |
| 1280 A3  | 3292 F2  | 7239 F6   |          |
| 1281 B3  | 3293 G2  | 7240 F6   |          |
| 1282 F10 | 3294 G2  | 7241 G7   |          |
| 1283 F10 | 3295 F8  | 7242 G7   |          |
| 1284 F10 | 3296 B5  | 7243 G7   |          |
| 1285 F6  | 4201 F5  | 7244 F8   |          |
| 1286 F7  | 4202 F5  | 7245 F9   |          |
| 1287 H7  | 4203 F5  | 7246 F10  |          |
| 1288 H6  | 4204 C9  | 7247 D11  |          |
| 1290 F3  | 4205 C9  | 7248 F8   |          |
| 1291 F2  | 4206 F3  | 7249 E11  |          |
| 1292 E11 | 4207 E2  | 7250 A7   |          |
| 1293 C10 | 4208 E2  | 1201 A5   |          |
| 1291 A3  | 4209 E3  | 1202 B5   |          |
| 1292 A4  | 4211 A4  | 1203 B6   |          |
| 1293 A4  | 4212 B4  | 1204 B6   |          |
| 1294 B3  | 4213 F5  | 1205 B6   |          |
| 1295 B4  | 4214 F5  | 1206 A7   |          |
| 1296 B4  | 4215 F5  | 1207 C7   |          |
| 1297 B6  | 5201 B5  | 1208 B7   |          |
| 1298 B6  | 5202 B5  | 1209 C8   |          |
| 1299 B6  | 5203 B7  | 1210 C8   |          |
| 1210 B8  | 5204 D5  | 1211 B8   |          |
| 1211 B6  | 5205 D5  | 1212 B9   |          |
| 1212 B6  | 5206 D4  | 1213 C10  |          |
| 1213 B6  | 5207 D4  | 1214 C10  |          |
| 1214 B7  | 5208 D5  | 1215 C10  |          |

## SSB: Sync Interface

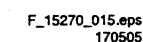


SSB: Audio Delay Line (Reserved)

**B4** AUDIO DELAY LINE (RESERVED)**B4**

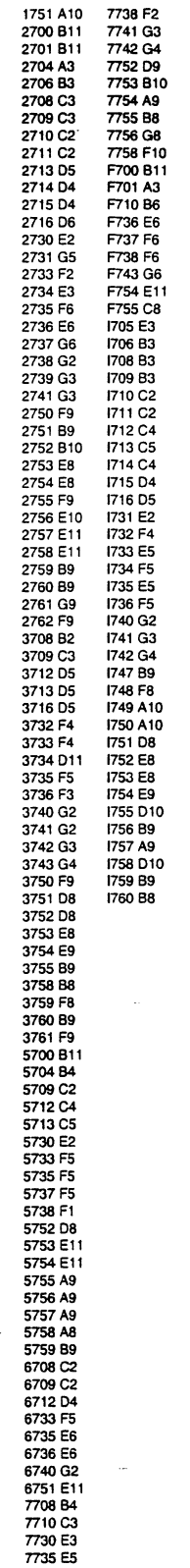
2501 A2  
2502 B2  
2503 D2  
2504 B8  
2505 B9  
2506 C10  
2507 D10  
2508 F6  
2509 F7  
3501 F6  
3502 F6  
4501 E2  
4502 F2  
4503 F2  
4504 F3  
4505 F3  
4506 F3  
4507 C9  
4508 C9  
4509 C9  
4510 C9  
4511 C9  
4512 C9  
4513 C9  
4514 C9  
5501 A1  
7501 A1  
7502 B3  
7503 F1  
7504 F6  
7505 B7  
7506 B8  
F501 A2  
F502 B2  
F503 C10  
F504 D10  
F505 F10  
I501 F5  
I502 F6  
I503 E2  
I504 E2  
I505 F2

## B5 AUDIO PROCESSING



|           |         |
|-----------|---------|
| 2603 A5   | 1602 A8 |
| 2604 A6   | 1603 B8 |
| 2605 B6   | 1604 A9 |
| 2608 B5   | 1605 B9 |
| 2609 B6   | 1606 C4 |
| 2610 B6   | 1607 C4 |
| 2611 B6   | 1608 A5 |
| 2612 E9   | 1610 B5 |
| 2613 C8   | 1611 C7 |
| 2614 B8   | 1612 C6 |
| 2615 A8   | 1613 E3 |
| 2616 A4   | 1614 E4 |
| 2617 B4   | 1615 E4 |
| 2618 B8   | 1616 E8 |
| 2619 F5   | 1617 F5 |
| 3604 A6   | 1618 A6 |
| 3605 A7   | 1619 D8 |
| 3609 B6   |         |
| 3610 B6   |         |
| 3611 B6   |         |
| 3612 B7   |         |
| 3615 C7   |         |
| 3616 E9   |         |
| 3617 C9   |         |
| 3618 C8   |         |
| 3619 D8   |         |
| 3620 E8   |         |
| 3621 E8   |         |
| 3623 F5   |         |
| 3625 C6   |         |
| 3626 D2   |         |
| 3627 D2   |         |
| 3628 D5   |         |
| 3629 E5   |         |
| 3630 E5   |         |
| 3631 F5   |         |
| 3632 A9   |         |
| 3633 B9   |         |
| 4601 D2   |         |
| 4602 C8   |         |
| 4603 F8   |         |
| 4604 A9   |         |
| 4605 B9   |         |
| 4606 C7   |         |
| 4609 A9   |         |
| 4610 B9   |         |
| 4611 B4   |         |
| 4612 B4   |         |
| 4613 D2   |         |
| 4614 F8   |         |
| 4615 F8   |         |
| 4616 C4   |         |
| 4617 C5   |         |
| 4618 A4   |         |
| 4619 B4   |         |
| 4620 E5   |         |
| 4621 E5   |         |
| 6601 E4   |         |
| 7601-1 A7 |         |
| 7601-2 B7 |         |
| 7602-1 C4 |         |
| 7602-2 C5 |         |
| 7602-3 D5 |         |
| 7602-4 D6 |         |
| 7603 E8   |         |
| 7604 D8   |         |
| 7605 E4   |         |
| 7606-1 E6 |         |
| 7606-2 F6 |         |
| 7607 C7   |         |
| F601 A4   |         |
| F602 B4   |         |
| F603 A6   |         |
| F604 B6   |         |
| F605 B6   |         |

## B6 DC-DC CONVERTER



## SSB: Diversity Tables B1-B6

B1 TUNER &amp; IF

| Item | AP - non China | Europe | NAFTA/L | AP - DVB | Europe - DVB | China | Description                    |
|------|----------------|--------|---------|----------|--------------|-------|--------------------------------|
| 1102 |                |        |         |          |              | V     | TUN V+U PLL IEC BGDKM B        |
| 1102 |                | V      |         |          |              |       | TUN V+U PLL IEC BGHIL B        |
| 1102 |                |        | V       |          |              |       | TUNER UV1338/A F S H-4         |
| 1102 | V              |        |         |          |              |       | TUNER UV1316E/A I H-4          |
| 1102 |                |        |         | V        | V            |       | TUNER UV1318SD/A CP H N-4      |
| 1104 |                | V      |         |          | V            |       | FIL SAW SM 38MHZ9 OFWK3953L R  |
| 1104 |                |        |         |          | V            |       | FIL SAW SM 38MHZ OFWM3956L R   |
| 1104 |                |        | V       |          |              |       | FIL SAW SM 45MHZ75 OFWM1967L R |
| 1104 | V              |        | V       |          |              |       | FIL SAW SM 38MHZ9 OFWK7265L R  |
| 1105 |                |        |         |          | V            |       | FIL SAW SM 38MHZ OFWK3955L R   |
| 1106 |                | V      |         |          | V            |       | FIL SAW SM 38MHZ9 OFWK9656L R  |
| 1106 |                |        |         |          | V            |       | FIL SAW SM 38MHZ OFWK9352L R   |
| 1106 | V              |        |         | V        |              |       | FIL SAW SM 38MHZ9 OFWK9361L R  |
| 3101 | V              |        | V       |          | V            |       | RST SM 0603 100R PM5 COL       |
| 3102 | V              |        | V       |          | V            |       | RST SM 0603 100R PM5 COL       |
| 3104 |                | V      |         |          | V            |       | RST SM 0603 10K PM5COL         |
| 3104 | V              |        | V       | V        | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 3107 | V              | V      |         | V        | V            |       | RST SM 0603 6K8 PM5 COL        |
| 3108 | V              | V      |         | V        | V            |       | RST SM 0603 2K2 PM5 COL        |
| 3109 | V              | V      |         | V        | V            |       | RST SM 0603 2K2 PM5 COL        |
| 3110 |                |        |         |          | V            |       | RST SM 0603 2K2 PM5 COL        |
| 3111 | V              | V      |         | V        | V            |       | RST SM 0603 22K PM5 COL        |
| 3112 | V              | V      |         | V        | V            |       | RST SM 0603 18K PM5 COL        |
| 3113 |                |        |         |          | V            |       | RST SM 0603 22K PM5 COL        |
| 3114 |                |        |         |          | V            |       | RST SM 0603 47K PM5 COL        |
| 4102 | V              | V      | V       | V        | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 4103 |                |        |         |          | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 4104 | V              |        |         | V        |              |       | RST SM 0603 JUMP. 0R05 COL     |
| 4106 |                | V      | V       |          | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 4107 |                |        |         |          | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 4108 |                |        |         |          | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 4110 | V              | V      |         | V        | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 4111 |                | V      |         |          | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 4113 | V              |        |         | V        | V            |       | RST SM 0603 JUMP. 0R05 COL     |
| 5101 | V              | V      |         | V        | V            |       | FXDIND SM 0805 0U39 PM10 COL R |
| 5101 |                |        | V       |          |              |       | FXDIND SM 0805 0U68 PM10 COL R |
| 5102 | V              | V      | V       | V        |              | V     | FXDIND SM 0805 12U PM10 COL R  |
| 5102 |                |        |         |          | V            |       | FXDIND SM 1008 6U8 PM5 COL R   |
| 5107 |                |        |         | V        | V            |       | FXDIND 0603 100MHZ 600R COL R  |
| 5107 |                | V      |         |          |              |       | RST SM 0603 100R PM5 COL       |
| 5108 |                |        |         | V        | V            |       | FXDIND 0603 100MHZ 600R COL R  |
| 5108 |                | V      |         |          |              |       | RST SM 0603 100R PM5 COL       |
| 6103 |                | V      |         |          | V            |       | DIO SIG SM BAS316 (COL) R      |
| 6105 |                |        |         |          | V            |       | DIO SIG SM 1SS356 (RHM0) R     |
| 7101 | V              | V      |         | V        | V            |       | TRA SIG SM BC847BW (COL) R     |
| 7102 |                |        |         |          | V            |       | TRA SIG SM BC847BW (COL) R     |

B2 HERCULES

| Item | LC4.3A AB (DVB-T) | LC4.3E AB/LC4.3E AB/LC4.3E AB (DVB-T) | LC4.3U/L | LC4.3E/LC4.3E/LC4.3E | LC4.3E W/O 3D COMB FILTER | LC4.3A - CHINA | LC4.3A - AP (non-China) | Description                    |
|------|-------------------|---------------------------------------|----------|----------------------|---------------------------|----------------|-------------------------|--------------------------------|
| 2203 | V                 | V                                     |          |                      |                           |                | V                       | ELCAP SM 16V 10U PM20 COL R    |
| 2229 |                   |                                       | V        |                      |                           |                |                         | CER2 0805 X5R 6V3 10U PM10 R   |
| 2244 | V                 | V                                     |          | V                    |                           |                |                         | CER2 0402 Y5V 16V 100N COL     |
| 2245 | V                 | V                                     |          | V                    |                           |                |                         | CER2 0402 Y5V 16V 100N COL     |
| 2246 | V                 | V                                     |          | V                    |                           |                |                         | CER2 0402 Y5V 16V 100N COL     |
| 2255 | V                 | V                                     | V        | V                    |                           | V              | V                       | CER2 0402 Y5V 16V 100N COL     |
| 2286 | V                 | V                                     | V        | V                    |                           | V              | V                       | CER2 0402 Y5V 16V 100N COL     |
| 2289 | V                 |                                       |          |                      |                           |                |                         | CER2 0805 Y5V 10V 4U7 P8020 R  |
| 2289 |                   |                                       |          | V                    |                           |                |                         | RST SM 0603 150R PM5 COL       |
| 2290 | V                 | V                                     |          | V                    | V                         |                |                         | CER2 0805 Y5V 10V 4U7 P8020 R  |
| 2291 | V                 | V                                     |          | V                    |                           |                |                         | CER2 0402 Y5V 16V 100N COL     |
| 2292 | V                 |                                       |          |                      |                           |                |                         | CER2 0402 Y5V 16V 100N COL     |
| 3250 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 100R PM5 COL       |
| 3251 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 100R PM5 COL       |
| 3252 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 100R PM5 COL       |
| 3253 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 100R PM5 COL       |
| 3255 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 JUMP. 0R05 COL     |
| 3256 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 JUMP. 0R05 COL     |
| 3257 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 JUMP. 0R05 COL     |
| 3258 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 1K PM5 COL         |
| 3259 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 1K PM5 COL         |
| 3260 | V                 |                                       | V        | V                    | V                         | V              | V                       | RST SM 0402 1K PM5 COL         |
| 3270 |                   |                                       |          |                      |                           |                |                         | RST SM 0402 10K PM5 COL        |
| 3282 | V                 |                                       |          |                      |                           |                |                         | RST SM 0603 150R PM5 COL       |
| 3285 | V                 | V                                     | V        | V                    |                           | V              | V                       | RST SM 0402 JUMP. 0R05 COL     |
| 3286 | V                 | V                                     | V        | V                    |                           | V              | V                       | RST SM 0402 100R PM5 COL       |
| 3291 | V                 |                                       |          |                      |                           |                |                         | RST SM 0402 47K PM5 COL        |
| 3292 |                   | V                                     |          |                      |                           |                |                         | RST SM 0402 12K PM5 COL        |
| 3292 | V                 |                                       |          |                      |                           |                |                         | RST SM 0402 47K PM5 COL        |
| 3293 | V                 |                                       |          |                      |                           |                |                         | RST SM 0402 47K PM5 COL        |
| 3294 | V                 | V                                     |          | V                    |                           |                |                         | RST SM 0402 47K PM5 COL        |
| 3295 | V                 | V                                     |          | V                    | V                         | V              | V                       | RST SM 0402 100K PM5 COL       |
| 3296 | V                 | V                                     |          |                      |                           |                |                         | RST SM 0402 100R PM5 COL       |
| 4206 |                   |                                       | V        |                      | V                         | V              | V                       | RST SM 0805 JUMP. 0R05 COL R   |
| 4213 | V                 | V                                     |          |                      |                           |                |                         | RST SM 0402 JUMP. 0R05 COL     |
| 4214 | V                 | V                                     |          |                      |                           |                |                         | RST SM 0402 JUMP. 0R05 COL     |
| 4215 | V                 | V                                     |          |                      |                           |                |                         | RST SM 0402 JUMP. 0R05 COL     |
| 5218 | V                 | V                                     |          | V                    |                           |                |                         | IND FXD 1206 EMI 100MHZ 120R R |
| 6206 | V                 |                                       |          |                      |                           |                |                         | DIO SIG SM BAT54 SOD323 COL R  |
| 7208 |                   | V                                     |          | V                    | V                         | V              | V                       | TRA SIG SM BC847BW (COL) R     |
| 7209 |                   | V                                     |          | V                    | V                         | V              | V                       | TRA SIG SM BC847BW (COL) R     |
| 7210 |                   | V                                     |          | V                    | V                         | V              | V                       | TRA SIG SM BC847BW (COL) R     |
| 7217 |                   |                                       | V        |                      |                           | V              |                         | IC SM TDA15011H/N1BD0 (PHSE) Y |
| 7217 | V                 | V                                     |          | V                    | V                         | V              | V                       | IC SM TDA15021H/N1B91 (PHSE) Y |
| 7219 | V                 | V                                     |          | V                    |                           |                |                         | IC SM 74HC4053D (PHSE) R       |

B3 SYNC INTERFACE

| Item | 26/32PFxxxx - AP/NAFTA/LT | EU & AP DVB sets | LC4.3E/LC4.3x/LC4.8x/LC4.3A-China | 26PF4310/10 | Description                  |
|------|---------------------------|------------------|-----------------------------------|-------------|------------------------------|
| 2449 | V                         | V                | V                                 |             | CER2 0402 Y5V 16V 100N COL   |
| 3432 |                           | V                |                                   |             | RST SM 0402 2K7 PM5 COL      |
| 3458 | V                         | V                | V                                 |             | RST SM 0402 100R PM5 COL     |
| 3459 | V                         | V                | V                                 |             | RST SM 0402 100R PM5 COL     |
| 3461 | V                         | V                | V                                 |             | RST SM 0402 100R PM5 COL     |
| 3462 | V                         | V                | V                                 |             | RST SM 0402 100R PM5 COL     |
| 4436 |                           |                  |                                   | V           | RST SM 0402 JUMP. 0R05 COL   |
| 4437 |                           |                  |                                   | V           | RST SM 0402 JUMP. 0R05 COL   |
| 4440 | V                         | V                | V                                 |             | RST SM 0402 JUMP. 0R05 COL   |
| 4441 | V                         | V                | V                                 |             | RST SM 0402 JUMP. 0R05 COL   |
| 6430 | V                         | V                | V                                 | V           | DIO REG SM PDZ2.48 (PHSE) R  |
| 6431 | V                         |                  | V                                 | V           | DIO SIG SM 1N4148WS (VISH) R |
| 7436 | V                         | V                | V                                 |             | IC SM 74LVC14APW (PHSE) R    |

B5 AUDIO WITHOUT AMPLIFIER

| Item | 26/32PF | 37/42/50PF | Description                  |
|------|---------|------------|------------------------------|
| 2612 |         | V          | CER2 0603 Y5V 10V 1U COL     |
| 2613 | V       |            | CER2 0603 Y5V 10V 1U COL     |
| 2616 | V       |            | CER2 0603 X5R 6V3 2U2 PM10 R |
| 2617 | V       |            | CER2 0603 X5R 6V3 2U2 PM10 R |
| 3615 | V       |            | RST SM 0402 10K PM5 COL      |
| 3616 | V       |            | RST SM 0402 1K PM5 COL       |
| 3617 | V       |            | RST SM 0402 1K PM5 COL       |
| 3618 | V       |            | RST SM 0402 22K PM5 COL      |
| 3619 | V       |            | RST SM 0402 10K PM5 COL      |
| 3620 | V       |            | RST SM 0402 10K PM5 COL      |
| 3623 | V       |            | RST SM 0402 47K PM5 COL      |
| 3625 | V       |            | RST SM 0402 3K3 PM5 COL      |
| 3627 | V       |            | RST SM 0402 22K PM5 COL      |
| 3628 | V       |            | RST SM 0402 10K PM5 COL      |
| 3629 | V       |            | RST SM 0402 22K PM5 COL      |
| 3630 | V       |            | RST SM 0402 330R PM5 COL     |
| 3630 | V       |            | RST SM 0402 470R PM5 COL     |
| 3631 | V       |            | RST SM 0402 330R PM5 COL     |
| 3631 | V       |            | RST SM 0402 470R PM5 COL     |
| 3632 | V       |            | RST SM 0402 RC31 39R PM5 R   |
| 3633 | V       |            | RST SM 0402 RC31 39R PM5 R   |
| 4601 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4602 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4603 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4606 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4609 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4610 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4611 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4612 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4613 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4614 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4615 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4616 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4617 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4618 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4619 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4620 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 4621 | V       |            | RST SM 0603 JUMP. 0R05 COL   |
| 7603 | V       |            | TRA SIG SM BC847BW (COL) R   |
| 7604 | V       |            | TRA SIG SM BC847BW (COL) R   |
| 7607 | V       |            | TRA SIG SM BC847BW (COL) R   |

B6 DC DC CONVERTER

| Item | 26/32PF LCD | 37/42PF LCD | 42/50PF PDP | DVB PDP 42PF | DVB LCD 37PF | Description                    |
|------|-------------|-------------|-------------|--------------|--------------|--------------------------------|
| 2701 | V           | V           | V           | V            | V            | CER1 0402 NP0 50V 100P COL     |
| 2706 | V           | V           | V           | V            | V            | ELCAP SM 16V 10U PM20 COL R    |
| 2709 | V           | V           | V           | V            | V            | ELCAP SM 16V 47U PM20 COL R    |
| 2710 | V           | V           | V           | V            | V            | CER2 1210 Y5V 25V 10U P8020 R  |
| 2711 | V           | V           | V           | V            | V            | CER2 1210 Y5V 25V 10U P8020 R  |
| 2713 | V           | V           | V           | V            | V            | ELCAP SM SEV 16V 470U PM20 R   |
| 2714 | V           | V           | V           | V            | V            | CER2 0402 X7R 50V 220P COL     |
| 2715 | V           | V           | V           | V            | V            | CER2 0402 X7R 16V 22N PM10 R   |
| 2741 | V           | V           | V           | V            | V            | CER2 0603 X7R 10V 220N COL     |
| 2751 | V           | V           |             | V            | V            | CER2 0402 Y5V 16V 100N COL     |
| 2752 | V           | V           |             | V            | V            | ELCAP SM 16V 47U PM20 COL R    |
| 2760 | V           | V           |             | V            | V            | CER2 1206 X7R 25V 1U PM10 R    |
| 2761 | V           | V           | V           | V            | V            | CER2 1206 X7R 25V 1U PM10 R    |
| 3708 | V           | V           | V           | V            | V            | RST SM 0402 10K PM5 COL        |
| 3709 | V           | V           | V           | V            | V            | RST SM 0402 6K8 PM5 COL        |
| 3712 | V           | V           | V           | V            | V            | RST SM 0603 RC22H 5K6 PM1 R    |
| 3713 | V           | V           | V           | V            | V            | RST SM 0603 RC22H 3K3 PM1 R    |
| 3716 | V           | V           | V           | V            | V            | RST SM 0402 4K7 PM5 COL        |
| 3740 | V           | V           | V           | V            | V            | RST SM 0402 1K5 PM5 COL        |
| 3741 | V           | V           | V           | V            | V            | RST SM 0402 1K5 PM5 COL        |
| 3742 | V           | V           | V           | V            | V            | RST SM 0402 15K PM5 COL        |
| 3743 | V           | V           | V           | V            | V            | RST SM 0402 22K PM5 COL        |
| 3755 | V           | V           |             | V            | V            | RST SM 0402 10K PM5 COL        |
| 3758 | V           | V           |             | V            | V            | RST SM 0402 15K PM5 COL        |
| 3760 | V           | V           |             | V            | V            | RST SM 0402 100R PM5 COL       |
| 3761 | V           | V           | V           | V            | V            | RST SM 0402 100R PM5 COL       |
| 5700 | V           | V           |             | V            | V            | IND FXD 1206 EMI 100MHZ 120R R |
| 5704 | V           | V           | V           | V            | V            | IND FXD SM 1206 10U PM20 R     |
| 5709 | V           | V           | V           | V            | V            | IND FXD SM 7032 10U PM20 R     |
| 5712 | V           | V           | V           | V            | V            | IND FXD SM 12565 33U PM20 R    |
| 5713 | V           | V           | V           | V            | V            | INDFXD SM 10145 10U PM20 R     |
| 5756 | V           | V           |             | V            | V            | IND FXD 1206 EMI 100MHZ 120R R |
| 5757 | V           | V           |             | V            | V            | IND FXD 1206 EMI 100MHZ 120R R |
| 6708 | V           | V           | V           | V            | V            | DIO REC SS24 COL R             |
| 6709 | V           | V           | V           | V            | V            | DIO REC SS14 COL R             |
| 6712 | V           | V           | V           | V            | V            | DIO REC SS36 COL R             |
| 6740 | V           | V           | V           | V            | V            | DIO REG SM PDZ8.2B (PHSE) R    |
| 7708 | V           | V           | V           | V            | V            | IC SM LF33CPT (ST00) R         |
| 7710 | V           | V           | V           | V            | V            | IC SM E-L5973D (ST00) R        |
| 7741 | V           | V           | V           | V            | V            | TRA SIG SM BC847BW (COL) R     |
| 7742 | V           | V           | V           | V            | V            | TRA SIG SM BC847BW (COL) R     |
| 7754 | V           | V           |             | V            | V            | FET POW SM S12301BDS-E3(VISH)R |
| 7755 | V           | V           |             | V            | V            | TRA SIG SM PDC114ET (COL) R    |

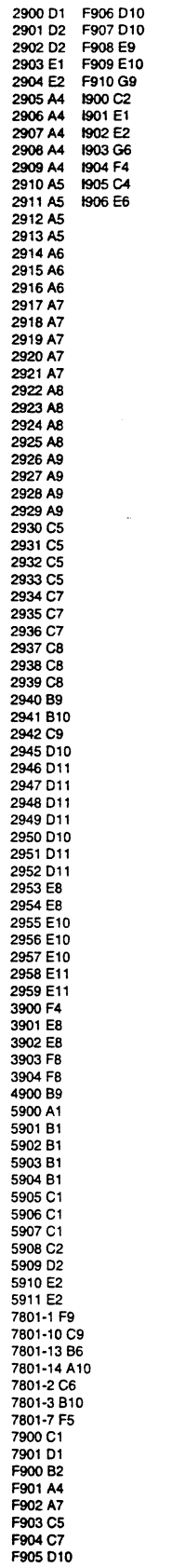


## SCALER



|             |             |
|-------------|-------------|
| 1902 B12    | 7801-12 A4  |
| 1902 G14    | 7801-12 C11 |
| 2000 A1     | 7801-5 E11  |
| 2001 A1     | 7801-6 F4   |
| 2602 A1     | 7801-9 G11  |
| 2602 A1     | F800 A1     |
| 2602 A2     | F801 B3     |
| 2605 A2     | F802 A8     |
| 2608 A2     | G803 G14    |
| 2608 A2     | H804 G14    |
| 2608 A2     | I800 G2     |
| 2609 A3     | I801 B12    |
| 2610 A3     | I802 F10    |
| 2612 A3     | I803 F10    |
| 2612 A3     | I804 E12    |
| 2613 B2     | I805 E12    |
| 2614 B3     | I806 F12    |
| 2615 A9     | I807 E12    |
| 2616 A9     | I808 F12    |
| 2617 A10    | I809 G12    |
| 2618 A10    | I810 G12    |
| 2619 A10    | I811 G14    |
| 2620 A12    | I812 F3     |
| 2621 A12    | I813 A1     |
| 2622 A12    | I814 G5     |
| 2623 A10    | I816 G2     |
| 2624 A12    | I817 H5     |
| 3600 B3     | I818 F3     |
| 3801-1 C1   | I819 B10    |
| 3802-1 C1   | I820 I10    |
| 3802-2 C1   | I821 I10    |
| 3802-3 C1   | I822 G12    |
| 3802-4 C1   |             |
| 3803-1 C1   |             |
| 3803-2 C1   |             |
| 3803-3 C1   |             |
| 3804-1 C1   |             |
| 3804-2 C1   |             |
| 3804-3 D1   |             |
| 3805-1 D1   |             |
| 3805-2 D1   |             |
| 3805-3 D1   |             |
| 3805-4 D1   |             |
| 3806-1 D1   |             |
| 3806-2 E1   |             |
| 3806-3 E1   |             |
| 3806-4 E1   |             |
| 3807-1 E1   |             |
| 3807-2 E1   |             |
| 3807-3 E1   |             |
| 3807-4 E1   |             |
| 3808-1 E1   |             |
| 3808-2 E1   |             |
| 3808-3 E1   |             |
| 3808-4 E1   |             |
| 3809-1 E6   |             |
| 3809-2 E6   |             |
| 3809-3 E6   |             |
| 3809-4 E6   |             |
| 3810-1 E6   |             |
| 3810-2 E6   |             |
| 3810-3 E6   |             |
| 3810-4 E6   |             |
| 3811-1 C6   |             |
| 3811-2 C6   |             |
| 3811-3 C6   |             |
| 3811-4 C6   |             |
| 3812-1 C6   |             |
| 3812-2 C6   |             |
| 3812-3 C6   |             |
| 3812-4 C6   |             |
| 3813-1 C6   |             |
| 3813-2 C6   |             |
| 3813-3 C6   |             |
| 3813-4 C6   |             |
| 3814 D6     |             |
| 3815 D6     |             |
| 3816 D6     |             |
| 3817 D6     |             |
| 3818 E6     |             |
| 3819 F2     |             |
| 3820 F1     |             |
| 3822 G5     |             |
| 3823 F5     |             |
| 3825-2 F9   |             |
| 3825-3 F9   |             |
| 3825-4 F9   |             |
| 3826-1 F9   |             |
| 3826-2 F9   |             |
| 3826-3 F9   |             |
| 3826-4 F9   |             |
| 3827 F13    |             |
| 3828 F13    |             |
| 3829 F13    |             |
| 3830 H10    |             |
| 3831 B9     |             |
| 3832 B9     |             |
| 3833 B9     |             |
| 3834 G13    |             |
| 3835 G13    |             |
| 3836 G13    |             |
| 3837 G14    |             |
| 3838 G14    |             |
| 3839 G3     |             |
| 3840 G3     |             |
| 3841 H14    |             |
| 4801 H5     |             |
| 7801-11 A11 |             |

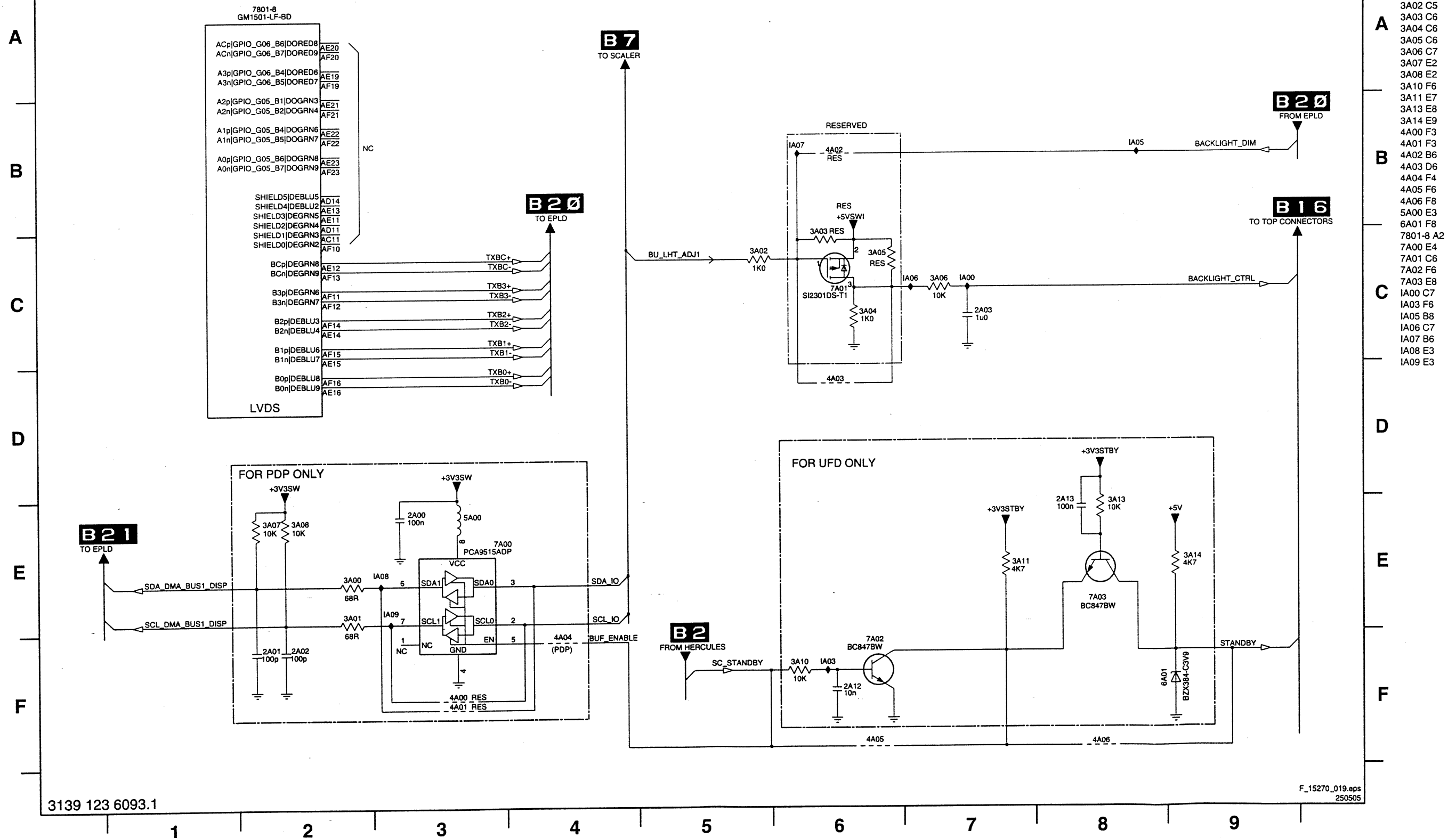
## B8 SCALER



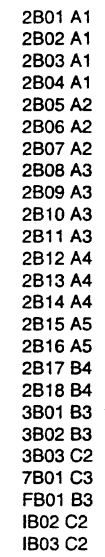


## SSB: Scaler Interface

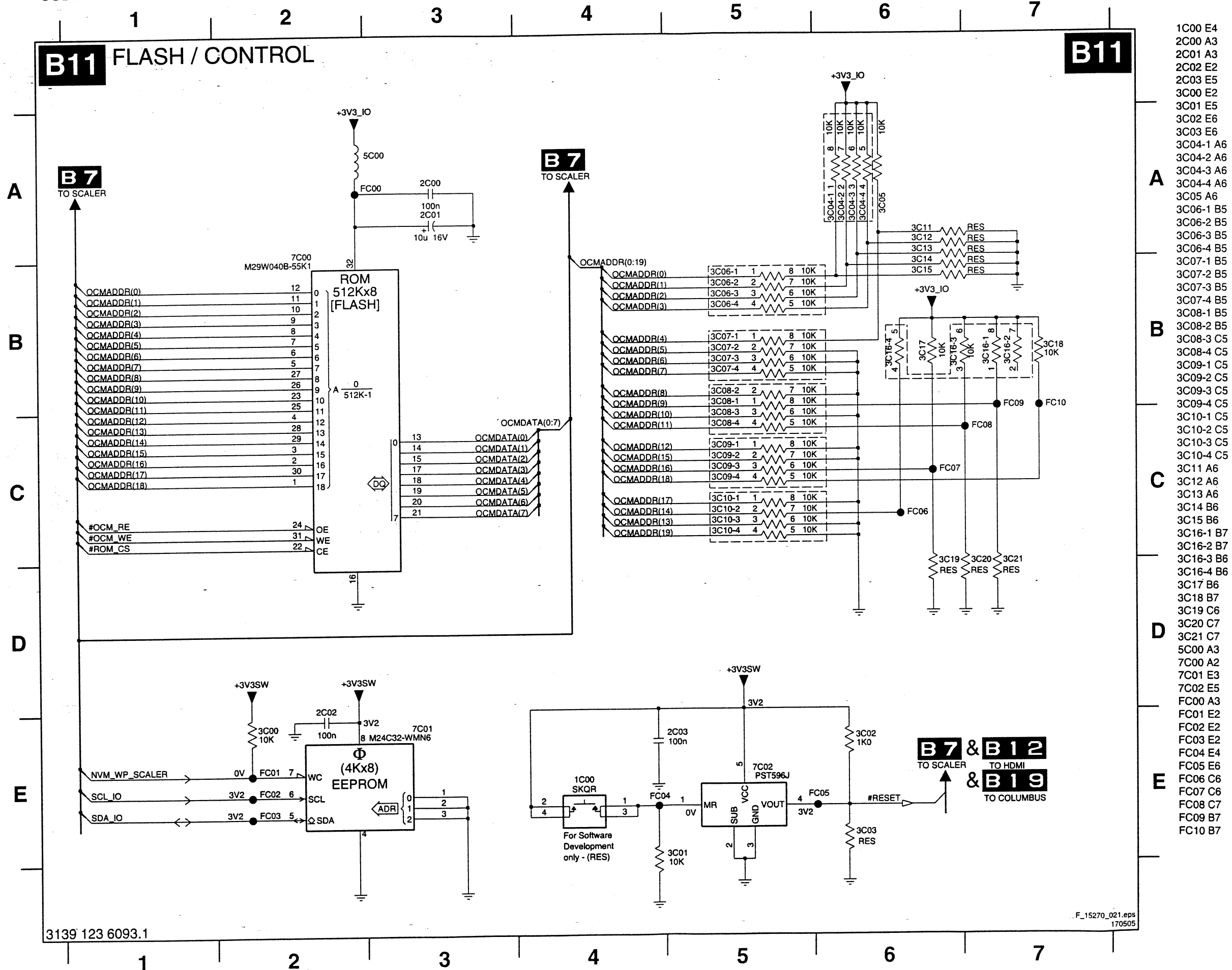
## B9 SCALER INTERFACE



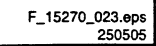
**B10** SDRAM



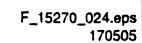
## SSB: Flash / Control



## B13 MUX-SYNC INTERFACE



## B14 DIGITAL IO



1F00-1 D1  
1F00-2 E1  
1F00-3 F1  
1F00-4 B1  
1F01 A7  
2F00 A2  
2F02 B2  
2F04 B3  
2F05 C2  
2F07 C3  
2F08 E2  
2F09 E2  
2F10 E3  
2F11 F2  
2F12 F2  
2F13 B9  
2F14 B9  
2F15 B9  
2F16 B9  
3F00 A2  
3F09 B2  
3F10 B3  
3F11 C2  
3F16 D4  
3F17 D4  
3F18 D4  
3F19 E2  
3F20 F2  
3F21 F2  
3F22 F3  
3F23 F3  
3F24 B8  
3F25 B8  
3F26 B9  
3F27 B9  
3F28 E2  
3F29 E2  
5F00 A3  
5F01 B3  
5F02 C3  
5F03 F4  
6F00 F4  
6F01 F3  
7F03 D2  
FF00 D1  
FF01 A1  
FF02 E1  
FF03 E1  
FF04 E1  
FF05 E1  
FF06 E1  
FF07 F1  
FF08 F1  
FF09 F1  
FF10 F1  
FF11 G1  
FF12 G1  
FF13 G1  
IF00 D3  
IF01 F2  
IF02 F4  
IF03 F5  
IF04 B8  
IF05 B8  
IF06 F1  
IF07 F1  
IF08 G1  
IF11 A6  
IF12 B1  
IF13 B1  
IF14 B2  
IF15 B2  
IF17 B6  
IF20 C6  
IF21 F5  
IF22 B9  
IF23 B9  
S001 B8  
S002 B8

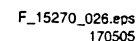
## B15 SCART ANALOGUE IO



|  |           |          |
|--|-----------|----------|
|  | 1G01-1 E1 | 3095 R   |
|  | 1G02-1 A1 | 3096 R   |
|  | 1G02-1 F1 | 3099 R   |
|  | 1G02-2 J1 | 3599 A   |
|  | 2001 A1   | 3501 G   |
|  | 2001 A3   | 3503 J   |
|  | 2002 A2   | 4000 A3  |
|  | 2003 B3   | 4001 B3  |
|  | 2004 B3   | 4002 B3  |
|  | 2005 A3   | 4006 G3  |
|  | 2006 B3   | 4009 B11 |
|  | 2007 A4   | 4010 B11 |
|  | 2007 A5   | 4011 D12 |
|  | 2008 B3   | 4012 D3  |
|  | 2010 B3   | 4013 D12 |
|  | 2011 B4   | 4014 F9  |
|  | 2012 B4   | 4015 F9  |
|  | 2013 A4   | 4016 G11 |
|  | 2017 E5   | 4017 G11 |
|  | 2019 G4   | 4019 H9  |
|  | 2020 B3   | 4020 B11 |
|  | 2021 A4   | 4021 B9  |
|  | 2022 H4   | 4022 K10 |
|  | 2023 H4   | 4026 E4  |
|  | 2024 G5   | 5000 E4  |
|  | 2025 A5   | 5001 D10 |
|  | 2026 E5   | 5002 E4  |
|  | 2028 J4   | 6000 F3  |
|  | 2029 B11  | 6001 F3  |
|  | 2029 B12  | 6002 B13 |
|  | 2031 C11  | 6003 B2  |
|  | 2032 C11  | 6004 E2  |
|  | 2033 C13  | 6005 A2  |
|  | 2034 E13  | 7003 E4  |
|  | 2035 C11  | 7006 F2  |
|  | 2036 F9   | 6008 F2  |
|  | 2037 F9   | 6009 E2  |
|  | 2038 F12  | 6010 G2  |
|  | 2039 E13  | 7003 E4  |
|  | 2040 E13  | 7005 J4  |
|  | 2041 F13  | 7007 B11 |
|  | 2042 H4   | 7008 B13 |
|  | 2043 H4   | 7009 E11 |
|  | 2046 H4   | 7010 J2  |
|  | 2047 J11  | 7010 A2  |
|  | 2048 G3   | 7001 A2  |
|  | 2049 G3   | 7002 A2  |
|  | 2050 B3   | 7003 B2  |
|  | 2051 H3   | 7004 B2  |
|  | 2052 F2   | 7005 C2  |
|  | 2053 E2   | 7006 E2  |
|  | 2054 B3   | 7007 C2  |
|  | 2055 B10  | 7009 E2  |
|  | 2056 C10  | 7010 E2  |
|  | 2057 C10  | 7012 F2  |
|  | 3000 A3   | 7013 F6  |
|  | 3001 A3   | 7014 G2  |
|  | 3002 A4   | 7015 G2  |
|  | 3003 B3   | 7016 G1  |
|  | 3004 B3   | 7017 G2  |
|  | 3005 B3   | 7018 H2  |
|  | 3006 B4   | 7019 H1  |
|  | 3007 B3   | 7020 E2  |
|  | 3008 J5   | 7021 H2  |
|  | 3009 J5   | 7022 J2  |
|  | 3010 C3   | 7023 J2  |
|  | 3013 C3   | 7024 C1  |
|  | 3014 C3   | 7025 C1  |
|  | 3015 C3   | 7026 G2  |
|  | 3016 C3   | 7027 H2  |
|  | 3017 D3   | 7028 H2  |
|  | 3018 D3   | 7030 E2  |
|  | 3027 D3   | 7032 G14 |
|  | 3028 E3   | 7033 G14 |
|  | 3029 E3   | 7034 G14 |
|  | 3030 E3   | 7035 G14 |
|  | 3031 F3   | 7036 G14 |
|  | 3032 E4   | 7037 H14 |
|  | 3033 F3   | 7038 H14 |
|  | 3034 E5   | 7039 H14 |
|  | 3035 D3   | 7040 H5  |
|  | 3036 F3   | 7041 H14 |
|  | 3039 G4   | 7042 H14 |
|  | 3040 G4   | 7043 H14 |
|  | 3041 H4   | 7044 H14 |
|  | 3042 H3   | 7045 H14 |
|  | 3043 H4   | 7047 H14 |
|  | 3044 H4   | 7048 H14 |
|  | 3045 H4   | 7049 H14 |
|  | 3046 H4   | 7050 H14 |
|  | 3047 H6   | 7051 H14 |
|  | 3048 H6   | 7053 H14 |
|  | 3051 H3   | 7054 H14 |
|  | 3052 H3   | 7055 H14 |
|  | 3053 J3   | 8000 A4  |
|  | 3054 J4   | 8001 A4  |
|  | 3055 B5   | 8002 A5  |
|  | 3056 B5   | 8003 B5  |
|  | 3057 B5   | 8004 B4  |
|  | 3058 J3   | 8005 B4  |
|  | 3059 J4   | 8006 C6  |
|  | 3060 K4   | 8007 C6  |
|  | 3061 K4   | 8008 D6  |
|  | 3064 C9   | 8009 D6  |
|  | 3065 B11  | 8010 D6  |
|  | 3066 C9   | 8011 E3  |
|  | 3067 C14  | 8012 E4  |
|  | 3068 C10  | 8013 E6  |
|  | 3069 B12  | 8014 G4  |
|  | 3070 B12  | 8015 G4  |
|  | 3071 G14  | 8016 G5  |
|  | 3072 D10  | 8017 G5  |
|  | 3073 D10  | 8018 G4  |
|  | 3074 D10  | 8019 H4  |
|  | 3075 E9   | 8020 H4  |
|  | 3076 E9   | 8021 H6  |
|  | 3077 F10  | 8023 H5  |
|  | 3078 F10  | 8024 J4  |
|  | 3079 D12  | 8025 J6  |
|  | 3080 J6   | 8026 J5  |
|  | 3081 D13  | 8027 K5  |
|  | 3082 D13  | 8028 D10 |
|  | 3083 E12  | 8029 E11 |
|  | 3084 E12  | 8030 F12 |
|  | 3085 F13  | 8040 H5  |
|  | 3086 F13  | 8042 E5  |
|  | 3087 F13  | 8043 J4  |
|  | 3088 H12  | 8046 H11 |
|  | 3089 H12  | 8047 B9  |
|  | 3090 H11  | 8049 B8  |
|  | 3091 H12  | 8050 B11 |
|  | 3092 J9   | 8052 C11 |
|  | 3093 H11  | 8053 H11 |
|  | 3094 B9   | 8054 C11 |

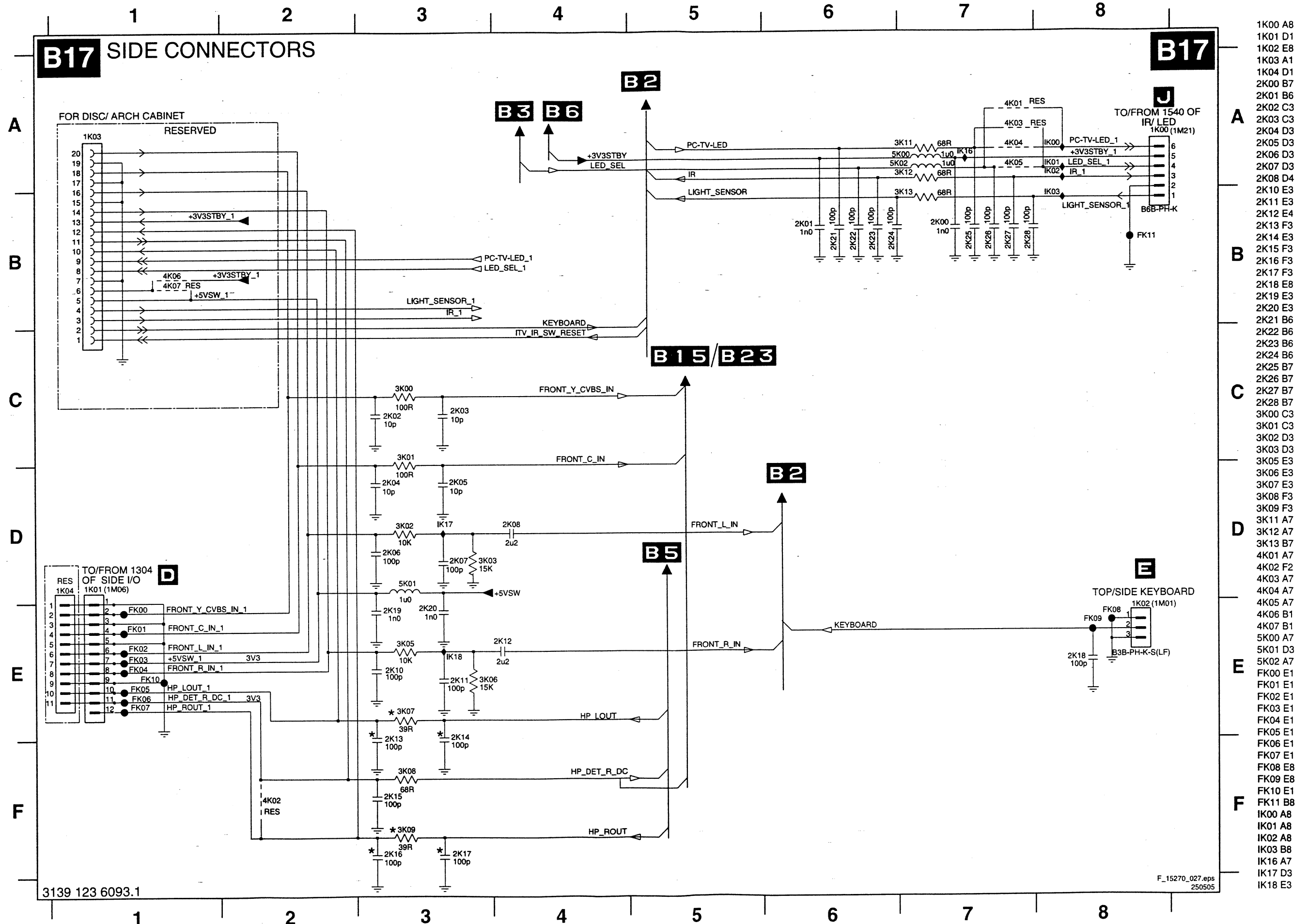


## B16 TOP CONNECTORS



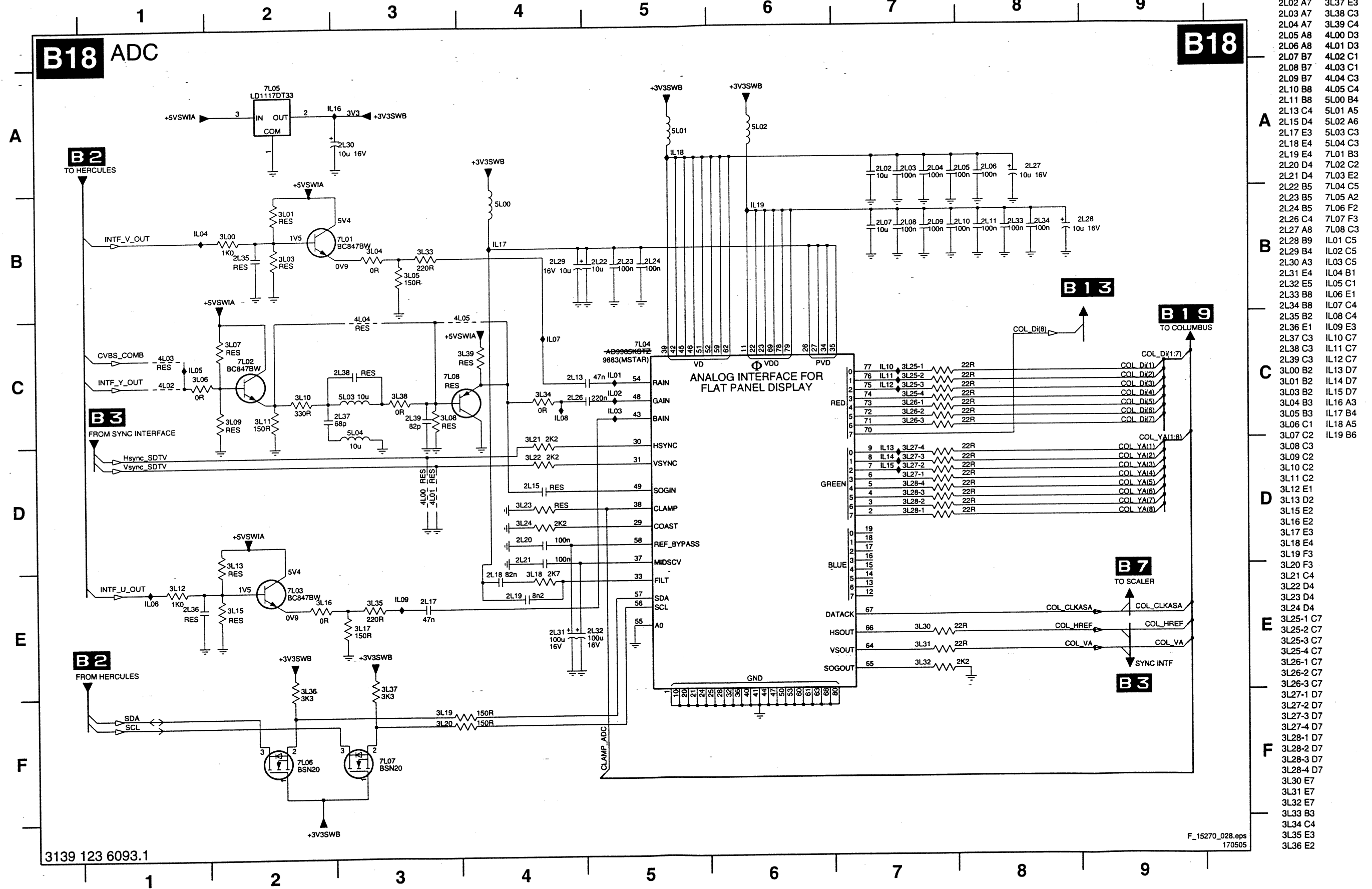
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|---------|---------|
| 1J00 B1 | FJ25 E7 |
| 1J01 C1 | FJ26 E7 |
| 1J02 D1 | IJ01 B1 |
| 1J03 F1 | IJ02 B1 |
| 1J04 B8 | IJ03 B1 |
| 1J05 C8 | IJ04 B1 |
| 1J06 E8 | IJ05 B1 |
| 1J07 C2 | IJ06 B1 |
| 1J08 C2 | IJ07 B1 |
| 2J02 F2 | IJ08 E2 |
| 2J03 F2 | IJ09 E2 |
| 2J04 D6 | IJ10 E2 |
| 2J05 D7 | IJ11 E2 |
| 2J06 D7 | IJ12 B4 |
| 2J07 D7 | IJ13 E4 |
| 2J08 D7 |         |
| 2J09 D7 |         |
| 2J10 E6 |         |
| 2J11 E7 |         |
| 2J12 E7 |         |
| 2J13 E7 |         |
| 2J14 E7 |         |
| 2J15 E7 |         |
| 2J16 C2 |         |
| 2J17 F3 |         |
| 2J18 F2 |         |
| 2J19 F3 |         |
| 2J20 C3 |         |
| 2J21 F3 |         |
| 2J22 F3 |         |
| 2J23 F3 |         |
| 2J26 C6 |         |
| 2J27 C7 |         |
| 2J28 C7 |         |
| 2J29 C7 |         |
| 2J30 F2 |         |
| 2J31 D2 |         |
| 2J33 C2 |         |
| 2J34 C3 |         |
| 2J35 F2 |         |
| 2J36 C7 |         |
| 3J03 E3 |         |
| 3J04 E3 |         |
| 3J05 E3 |         |
| 3J06 B3 |         |
| 4J01 D2 |         |
| 4J02 C2 |         |
| 5J01 B7 |         |
| 5J02 B7 |         |
| 5J03 E2 |         |
| 5J04 C2 |         |
| 5J05 B3 |         |
| FJ00 C1 |         |
| FJ01 C1 |         |
| FJ02 C1 |         |
| FJ03 C1 |         |
| FJ04 C1 |         |
| FJ05 D1 |         |
| FJ06 E2 |         |
| FJ07 E2 |         |
| FJ08 F1 |         |
| FJ09 F2 |         |
| FJ10 B7 |         |
| FJ11 B8 |         |
| FJ12 B7 |         |
| FJ13 B7 |         |
| FJ14 C7 |         |
| FJ15 C7 |         |
| FJ16 C7 |         |
| FJ17 D7 |         |
| FJ18 D7 |         |
| FJ19 D7 |         |
| FJ20 D7 |         |
| FJ21 E7 |         |
| FJ22 E7 |         |
| FJ23 E7 |         |
| FJ24 E7 |         |

## SSB: Side Connectors





SSB: ADC



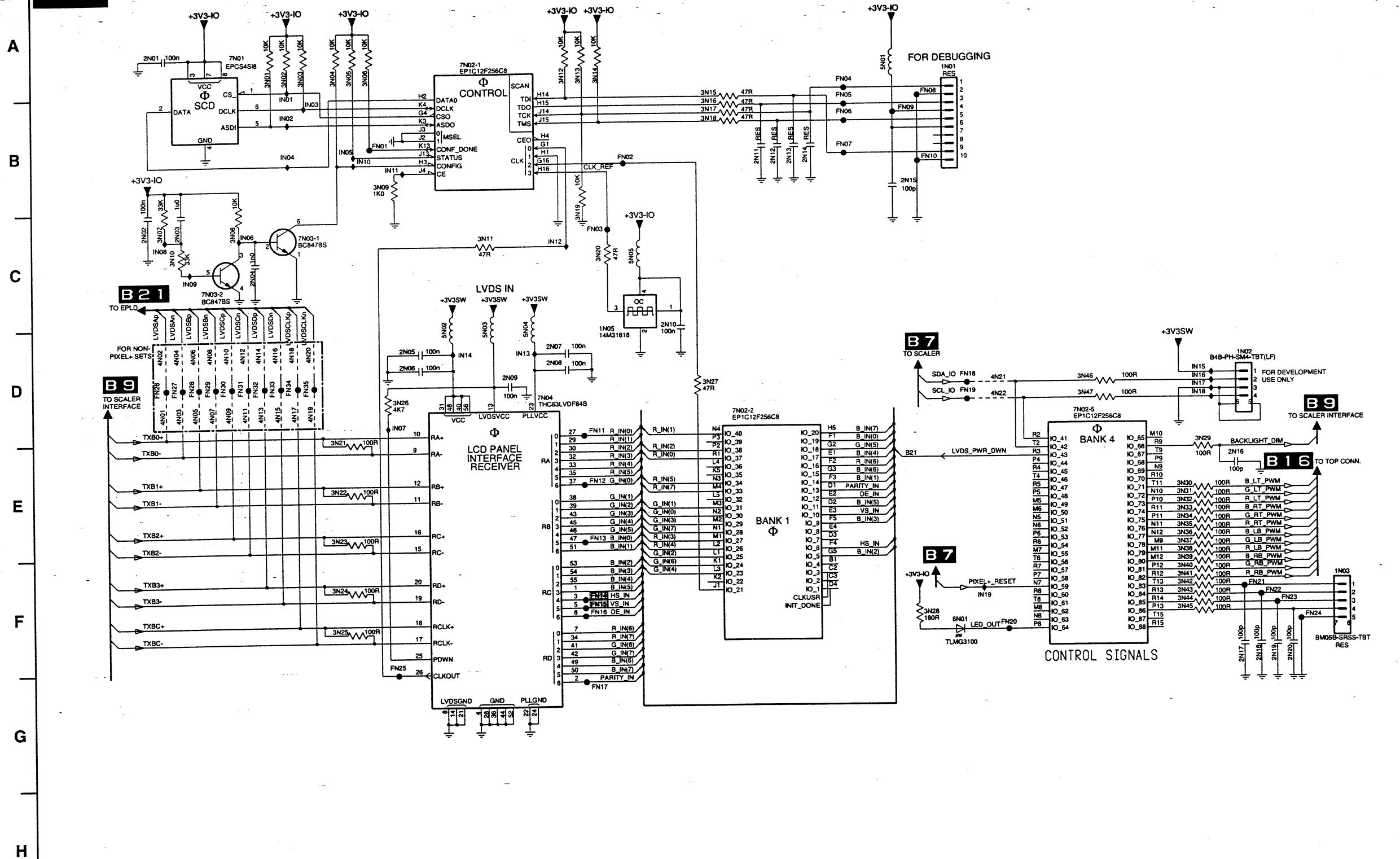
## B19 COLUMBUS



|           |            |
|-----------|------------|
| 2M00 E2   | 3M67 A5    |
| 2M01 E2   | 3M68 C9    |
| 2M02 E3   | 3M69 C5    |
| 2M03 E3   | 3M69 E4    |
| 2M04 E2   | 4M00 B57   |
| 2M05 E3   | 4M01 B5    |
| 2M06 E3   | 4M02 B5    |
| 2M07 E3   | 4M03 B57   |
| 2M08 E3   | 4M04 F3    |
| 2M09 E4   | 4M05 F39   |
| 2M10 E4   | 4M06 F3    |
| 2M11 E5   | 4M08 F7    |
| 2M12 E5   | 4M09 F7    |
| 2M13 E6   | 4M10 D10   |
| 2M14 E6   | 4M16 F3    |
| 2M15 E6   | 4M17 F3    |
| 2M16 E6   | 5M00 E8    |
| 2M17 E6   | 5M01 F7    |
| 2M18 E7   | 5M02 E2    |
| 2M19 E7   | 5M03 A2    |
| 2M20 E7   | 5M04 A2    |
| 2M21 E7   | 5M05 A10   |
| 2M22 E8   | 7M00-1 A7  |
| 2M23 E8   | 7M00-2 F4  |
| 2M24 F7   | 7M01 B11   |
| 2M25 A9   | 7M03 E8    |
| 2M26 A10  | 7M14-1 E10 |
| 2M27 A10  | 7M14-2 E11 |
| 2M28 A10  | 7M15-1 F10 |
| 2M29 A11  | 7M17 A4    |
| 2M30 A11  | FM01 G2    |
| 2M31 E4   | FM02 G2    |
| 2M32 A9   | FM03 G2    |
| 2M33 F3   | FM04 G2    |
| 2M56 E7   | FM05 G2    |
| 2M60 F9   | IM00 C8    |
| 2M61 F11  | IM01 E7    |
| 2M62 G9   | IM03 C5    |
| 2M65 A2   | IM04 C5    |
| 2M66 A2   | IM06 C5    |
| 2M67 B2   | IM07 C5    |
| 2M68 B2   | IM08 D5    |
| 3M00 A4   | IM09 E8    |
| 3M01-1 B7 | IM10 C8    |
| 3M01-2 B7 | IM11 F7    |
| 3M01-3 B7 |            |
| 3M01-4 B7 |            |
| 3M02-1 B7 |            |
| 3M02-2 B7 |            |
| 3M02-3 B7 |            |
| 3M02-4 B7 |            |
| 3M03-1 B7 |            |
| 3M03-2 B7 |            |
| 3M03-3 B7 |            |
| 3M03-4 B7 |            |
| 3M04-1 C7 |            |
| 3M04-2 C7 |            |
| 3M04-3 C7 |            |
| 3M04-4 C7 |            |
| 3M06-1 C7 |            |
| 3M06-2 C7 |            |
| 3M06-3 C7 |            |
| 3M06-4 C7 |            |
| 3M07-1 C7 |            |
| 3M07-2 D7 |            |
| 3M07-3 D7 |            |
| 3M07-4 D7 |            |
| 3M08-1 D7 |            |
| 3M08-2 D7 |            |
| 3M08-3 D7 |            |
| 3M08-4 D7 |            |
| 3M09-1 D7 |            |
| 3M09-2 D7 |            |
| 3M09-3 E7 |            |
| 3M10 F3   |            |
| 3M11 F3   |            |
| 3M12 G3   |            |
| 3M13 H3   |            |
| 3M14 G7   |            |
| 3M15 G7   |            |
| 3M16 C9   |            |
| 3M26 C4   |            |
| 3M27 D4   |            |
| 3M28 C7   |            |
| 3M29 D7   |            |
| 3M50 G3   |            |
| 3M51 G3   |            |
| 3M52 G3   |            |
| 3M53 G2   |            |
| 3M54 G2   |            |
| 3M55 G2   |            |
| 3M56 G2   |            |
| 3M57 G2   |            |
| 3M58 G2   |            |
| 3M59 G2   |            |
| 3M68 E9   |            |
| 3M69 E11  |            |
| 3M71 F9   |            |
| 3M78 F7   |            |
| 3M79 A5   |            |
| 3M86 A6   |            |

**B20** EPLD

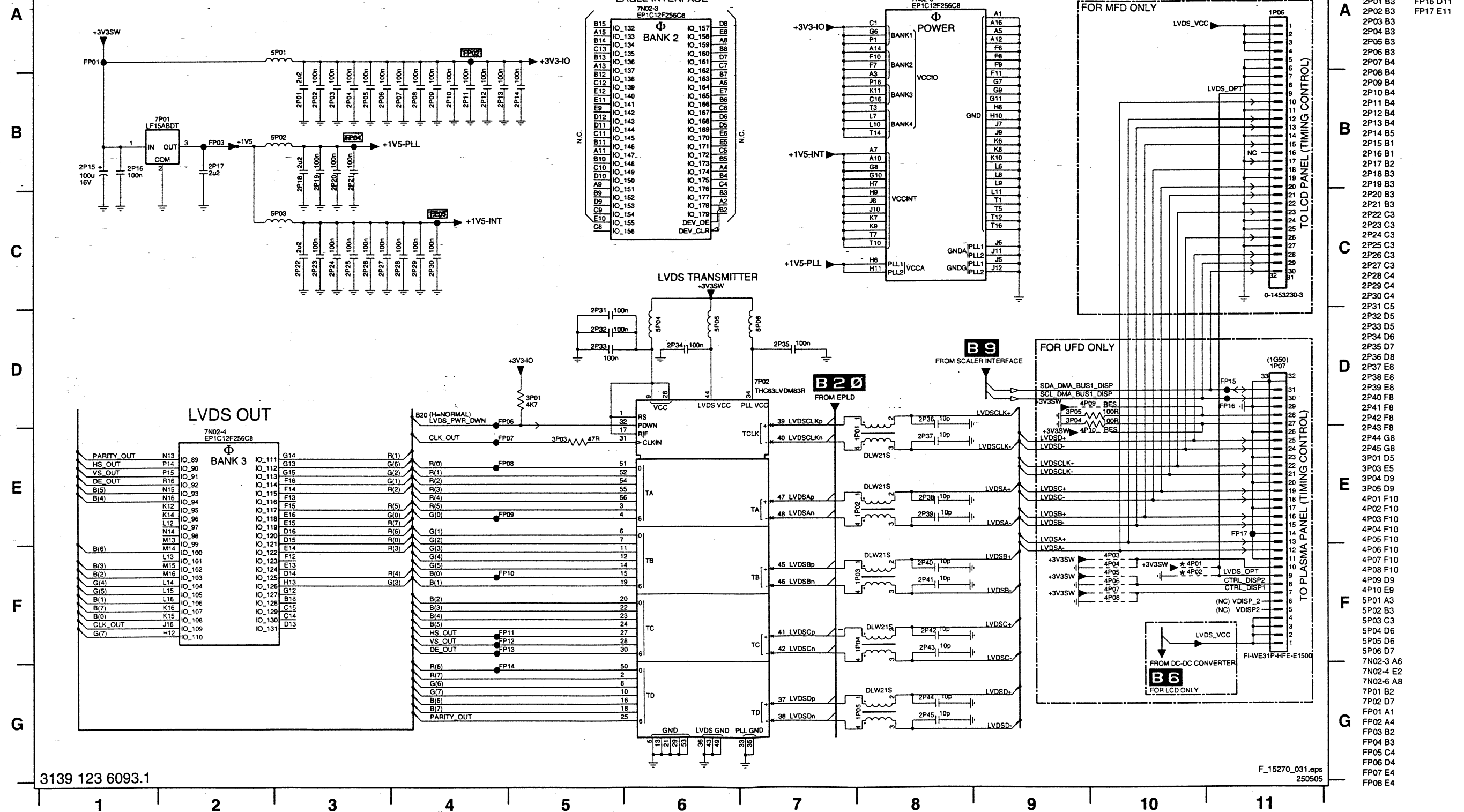
# B20



|           |            |
|-----------|------------|
| 1N01 A9   | 7N02-2 D7  |
| 1N02 D11  | 7N02-5 D10 |
| 1N03 F12  | 7N03-1 C3  |
| 1N05 D5   | 7N03-2 C2  |
| 2N01 A2   | 7N04 D5    |
| 2N02 C1   | FN01 B4    |
| 2N03 C2   | FN02 B6    |
| 2N04 C2   | FN03 C5    |
| 2N05 D4   | FN04 A8    |
| 2N06 D4   | FN05 B8    |
| 2N07 D5   | FN06 B8    |
| 2N08 D5   | FN07 B8    |
| 2N09 D5   | FN08 B8    |
| 2N10 D6   | FN09 B8    |
| 2N11 B7   | FN10 B8    |
| 2N12 B7   | FN11 D5    |
| 2N13 B7   | FN12 E5    |
| 2N14 B7   | FN13 E5    |
| 2N15 B8   | FN14 E5    |
| 2N16 E11  | FN15 F5    |
| 2N17 F11  | FN16 F5    |
| 2N18 F11  | FN17 G5    |
| 2N19 F11  | FN18 D9    |
| 2N20 F11  | FN19 D9    |
| 3N01 A3   | FN20 F9    |
| 3N02 A3   | FN21 F11   |
| 3N03 A3   | FN22 F11   |
| 3N04 A3   | FN23 F11   |
| 3N05 A3   | FN24 F12   |
| 3N06 A3   | FN25 F4    |
| 3N07 C2   | FN26 D2    |
| 3N08 C2   | FN27 D2    |
| 3N09 B4   | FN28 D2    |
| 3N10 C2   | FN29 D2    |
| 3N11 C4   | FN30 D2    |
| 3N12 A5   | FN31 D2    |
| 3N13 A5   | FN32 D2    |
| 3N14 A5   | FN33 D3    |
| 3N15 B6   | FN34 D3    |
| 3N16 B6   | FN35 D3    |
| 3N17 B6   | FN01 B3    |
| 3N18 B6   | FN02 B3    |
| 3N19 C5   | FN03 B3    |
| 3N20 C5   | FN04 B3    |
| 3N21 E3   | FN05 B3    |
| 3N22 E3   | FN06 C2    |
| 3N23 E3   | FN07 C2    |
| 3N24 F3   | FN08 C2    |
| 3N25 F3   | FN09 C2    |
| 3N26 D4   | FN10 B3    |
| 3N27 D6   | FN11 B4    |
| 3N28 F8   | FN12 C5    |
| 3N29 E11  | FN13 D5    |
| 3N30 E11  | FN14 D5    |
| 3N31 E11  | FN15 D11   |
| 3N32 E11  | FN16 D11   |
| 3N33 E11  | FN17 D11   |
| 3N34 E11  | FN18 D11   |
| 3N35 E11  | FN19 F9    |
| 3N36 E11  |            |
| 3N37 E11  |            |
| 3N38 F11  |            |
| 3N39 F11  |            |
| 3N40 F11  |            |
| 3N41 F11  |            |
| 3N42 F11  |            |
| 3N43 F11  |            |
| 3N44 F11  |            |
| 3N45 F11  |            |
| 3N46 D10  |            |
| 3N47 D10  |            |
| 4N01 D2   |            |
| 4N02 D2   |            |
| 4N03 D2   |            |
| 4N04 D2   |            |
| 4N05 D2   |            |
| 4N06 D2   |            |
| 4N07 D2   |            |
| 4N08 D2   |            |
| 4N09 D2   |            |
| 4N10 D2   |            |
| 4N11 D2   |            |
| 4N12 D2   |            |
| 4N13 D2   |            |
| 4N14 D2   |            |
| 4N15 D3   |            |
| 4N16 D3   |            |
| 4N17 D3   |            |
| 4N18 D3   |            |
| 4N19 D3   |            |
| 4N20 D3   |            |
| 4N21 D9   |            |
| 4N22 D9   |            |
| 5N01 A8   |            |
| 5N02 D4   |            |
| 5N03 D4   |            |
| 5N04 D5   |            |
| 5N05 C6   |            |
| 6N01 F9   |            |
| 7N01 A2   |            |
| 7N02-1 A4 |            |

**B21** EPLD

**B21**



SSB: Diversity Tables B9-B21

B9 MUX-SYNC INTERFACE

| Item | LC4.3x | LC4.8x | LC4.9x | Description                  |
|------|--------|--------|--------|------------------------------|
| 2A00 |        |        | V      | CER2 0603 X7R 16V 100N COL   |
| 2A01 |        |        | V      | CER1 0402 NP0 50V 100P COL   |
| 2A02 |        |        | V      | CER1 0402 NP0 50V 100P COL   |
| 2A03 |        | V      |        | CER2 0603 Y5V 10V 1U COL     |
| 2A12 |        | V      | V      | CER2 0402 X7R 16V 10N COL    |
| 2A13 |        | V      | V      | CER2 0402 Y5V 16V 100N COL   |
| 3A00 |        |        | V      | RST SM 0402 68R PM5 COL      |
| 3A01 |        |        | V      | RST SM 0402 68R PM5 COL      |
| 3A02 | V      | V      |        | RST SM 0402 1K PM5 COL       |
| 3A06 |        | V      |        | RST SM 0603 10K PM5COL       |
| 3A06 | V      |        |        | RST SM 0603 JUMP. 0R05 COL   |
| 3A07 |        |        | V      | RST SM 0402 10K PM5 COL      |
| 3A07 |        |        | V      | RST SM 0402 68R PM5 COL      |
| 3A08 |        |        | V      | RST SM 0402 10K PM5 COL      |
| 3A10 |        | V      | V      | RST SM 0402 10K PM5 COL      |
| 3A11 |        | V      | V      | RST SM 0402 10K PM5 COL      |
| 3A13 |        | V      | V      | RST SM 0402 10K PM5 COL      |
| 3A14 |        | V      | V      | RST SM 0402 560R PM5 COL     |
| 4A03 | V      | V      |        | RST SM 0603 JUMP. 0R05 COL   |
| 4A04 |        |        | V      | RST SM 0402 JUMP. 0R05 COL   |
| 4A05 | V      |        |        | RST SM 0402 JUMP. 0R05 COL   |
| 4A06 | V      |        |        | RST SM 0402 JUMP. 0R05 COL   |
| 5A00 |        |        | V      | FXDIND 0805 100MHZ 30R COL R |
| 6A01 |        | V      | V      | DIO REG SM BZX384-C3V9 COL R |
| 7A00 |        |        | V      | IC SM PCA9515ADP (PHSE) R    |
| 7A02 |        | V      | V      | TRA SIG SM BC847BW (COL) R   |
| 7A03 |        | V      | V      | TRA SIG SM BC847BW (COL) R   |

B13 MUX-SYNC INTERFACE

| ITEM | APIEUAP DVB (with Teletext) | EU DVB (with Teletext) | NAFTA/LT & China (non-Teletext) | DESCRIPTION                  |
|------|-----------------------------|------------------------|---------------------------------|------------------------------|
| 2E00 | V                           |                        | V                               | CER2 0603 X5R 6V3 4U7 PM10 R |
| 2E01 | V                           |                        | V                               | CER2 0603 X5R 6V3 4U7 PM10 R |
| 2E02 | V                           | V                      | V                               | CER2 0603 X5R 6V3 4U7 PM10 R |
| 2E04 | V                           | V                      |                                 | CER2 0402 X5R 6V3 1U PM20 R  |
| 2E05 | V                           | V                      |                                 | CER2 0402 X5R 6V3 1U PM20 R  |
| 2E06 | V                           | V                      |                                 | CER2 0402 X5R 6V3 1U PM20 R  |
| 3E06 |                             | V                      |                                 | RST SM 0402 47K PM5 COL      |
| 3E07 | V                           |                        | V                               | RST SM 0402 47K PM5 COL      |
| 3E08 | V                           | V                      | V                               | RST SM 0402 47K PM5 COL      |
| 3E13 | V                           | V                      |                                 | RST SM 0402 330R PM5 COL     |
| 3E14 | V                           | V                      |                                 | RST SM 0402 330R PM5 COL     |
| 3E15 | V                           | V                      |                                 | RST SM 0402 330R PM5 COL     |
| 3E16 | V                           | V                      |                                 | RST SM 0402 330R PM5 COL     |
| 3E17 | V                           | V                      |                                 | RST SM 0402 330R PM5 COL     |
| 3E18 | V                           | V                      |                                 | RST SM 0402 330R PM5 COL     |

B15 ANALOG I/O SCART

| Item | 26/32PF | DVB.T 26/32PF | 37/42PF | DVB.T 37/42PF | Description                   |
|------|---------|---------------|---------|---------------|-------------------------------|
| 1G01 |         |               | V       | V             | SOC EURO H 21P F 8K R-GRND B  |
| 1G01 |         |               | V       | V             | SOC EURO H 21P F SHD R-GRND Y |
| 1G02 | V       | V             |         |               | SOC EURO H 21P F 8K R-GRND B  |
| 1G02 |         |               | V       | V             | SOC EURO H 21P F SHD R-GRND Y |
| 1G03 |         | V             | V       |               | CON H 32P F 0.50 SM FPC 0.3 R |
| 2G29 |         | V             | V       | V             | ELCAP SM 16V 10U PM20 COL R   |
| 2G30 |         | V             | V       | V             | CER2 0603 X7R 16V 100N COL    |
| 2G31 |         | V             | V       | V             | CER2 0603 X7R 16V 100N COL    |
| 2G32 |         |               | V       | V             | CER2 0603 Y5V 25V 100N COL    |
| 2G33 |         | V             | V       | V             | CER2 0603 Y5V 16V 220N COL    |
| 2G34 |         | V             | V       | V             | ELCAP SM 16V 10U PM20 COL R   |
| 2G35 |         | V             | V       | V             | CER2 0603 Y5V 25V 100N COL    |
| 2G36 |         | V             | V       | V             | CER2 0603 Y5V 10V 1U COL      |
| 2G37 |         | V             | V       | V             | RST SM 0603 330R PM5 COL      |
| 2G38 |         | V             | V       | V             | CER2 0603 Y5V 10V 1U COL      |
| 2G39 |         | V             | V       | V             | CER2 0603 Y5V 10V 1U COL      |
| 2G40 |         | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 2G41 |         | V             | V       | V             | RST SM 0603 330R PM5 COL      |
| 2G43 |         | V             | V       | V             | CER2 0603 X7R 50V 1N COL      |
| 2G45 |         | V             | V       | V             | CER2 0603 X7R 50V 1N COL      |
| 2G46 |         | V             | V       | V             | CER2 0603 X7R 50V 1N COL      |
| 2G63 |         | V             | V       | V             | CER2 0603 X5R 6V3 2U2 PM10 R  |
| 2G64 |         | V             | V       | V             | CER2 0603 X5R 6V3 2U2 PM10 R  |
| 2G65 |         | V             | V       | V             | CER2 0603 X5R 6V3 4U7 PM10 R  |
| 2G65 |         | V             | V       | V             | CER2 0603 X5R 6V3 4U7 PM10 R  |
| 2G66 |         | V             | V       | V             | CER2 0603 X5R 6V3 4U7 PM10 R  |
| 3G63 |         | V             | V       | V             | RST SM 0603 10K PM5COL        |
| 3G64 |         | V             | V       | V             | RST SM 0603 10K PM5COL        |
| 3G65 |         | V             | V       | V             | RST SM 0603 10K PM5COL        |
| 3G66 |         | V             | V       | V             | RST SM 0603 150R PM5 COL      |
| 3G67 |         | V             | V       | V             | RST SM 0603 15K PM5 COL       |
| 3G68 |         | V             | V       | V             | RST SM 0603 15K PM5 COL       |
| 3G69 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G70 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G71 |         | V             | V       | V             | RST SM 0603 560R PM5 COL      |
| 3G72 |         | V             | V       | V             | RST SM 0603 10K PM5COL        |
| 3G73 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G75 |         | V             | V       | V             | RST SM 0603 100R PM5 COL      |
| 3G76 |         | V             | V       | V             | RST SM 0603 100R PM5 COL      |
| 3G77 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G79 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G81 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G83 |         | V             | V       | V             | RST SM 0603 100R PM5 COL      |
| 3G84 |         | V             | V       | V             | RST SM 0603 100R PM5 COL      |
| 3G88 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G88 |         | V             | V       | V             | RST SM 0603 75R PM5 COL       |
| 3G89 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G92 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G93 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G94 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 3G95 |         | V             | V       | V             | RST SM 0603 47K PM5 COL       |
| 4G09 |         | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G11 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G12 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G13 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G14 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G15 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G16 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G17 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G18 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G19 | V       | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 4G22 |         | V             | V       | V             | RST SM 0603 JUMP. 0R05 COL    |
| 5G01 |         | V             | V       | V             | FXDIND 0603 100MHZ 120R COL R |
| 6G02 |         | V             | V       | V             | DIO SIG SM BAS316 (COL) R     |
| 7G07 |         | V             | V       | V             | IC SM 74HC4053D (PHSE) R      |
| 7G08 |         | V             | V       | V             | TRA SIG SM BC847B (COL) R     |
| 7G09 |         | V             | V       | V             | IC SM ADG734BRUZ (ANA0) R     |

B16 SIDE CONNECTORS

| Item | LC4.3x - CINCH | LC4.3E - SCART | LC4.8x - PDP | LC4.8x - LCD | Description                    |
|------|----------------|----------------|--------------|--------------|--------------------------------|
| 1J00 |                |                | V            | V            | CON V 10P M 2.00 PH B          |
| 1J01 |                |                | V            | V            | CON V 11P M 2.00 PH B          |
| 1J02 | V              | V              |              |              | CON V 12P M 2.00 PH B          |
| 1J03 | V              | V              |              |              | CON V 3P M 2.00 PH B           |
| 1J07 |                |                | V            | V            | FUSE SM T 3A 125V UL R         |
| 1J08 |                |                | V            | V            | FUSE SM F 630MA 50V UL R       |
| 2J31 |                |                | V            | V            | CER1 0402 NP0 50V 100P COL     |
| 3J03 | V              | V              |              |              | RST SM 0402 68R PM5 COL        |
| 3J04 | V              | V              |              |              | RST SM 0402 68R PM5 COL        |
| 4J01 |                |                | V            | V            | RST SM 0402 JUMP. 0R05 COL     |
| 5J04 |                |                | V            | V            | IND FXD 1206 EMI 100MHZ 120R R |

B17 SIDE CONNECTORS

| Item | LC4.3x - MES styling | LC4.3x - Arch Styling | LC4.8x - LCD | LC4.8x - PDP | Description                  |
|------|----------------------|-----------------------|--------------|--------------|------------------------------|
| 1K00 |                      |                       | V            | V            | CON V 6P M 2.00 PH B         |
| 1K01 | V                    |                       |              |              | CON V 12P M 2.00 PH B        |
| 1K03 |                      | V                     |              |              | CON V 20P F 1.25 FFC 0.3 B   |
| 1K04 |                      |                       | V            | V            | CON V 11P M 2.00 PH B        |
| 2K15 | V                    | V                     |              |              | CER1 0402 NP0 50V 100P COL   |
| 3K08 | V                    | V                     |              |              | RST SM 0402 68R PM5 COL      |
| 4K02 |                      |                       | V            | V            | RST SM 0603 JUMP. 0R05 COL   |
| 4K06 |                      | V                     |              |              | RST SM 0402 JUMP. 0R05 COL   |
| 5K01 | V                    | V                     | V            | V            | FXDIND SM 0603 1U PM10 COL R |

B18 ADC

| Item | non-DVB sets with 3D Comb Filter | DVB sets with 3D Comb Filter | Description                |
|------|----------------------------------|------------------------------|----------------------------|
| 3L38 | V                                | V                            | RST SM 0402 JUMP. 0R05 COL |
| 4L05 | V                                | V                            | RST SM 0402 JUMP. 0R05 COL |
| 5L04 | V                                | V                            | RST SM 0603 JUMP. 0R05 COL |

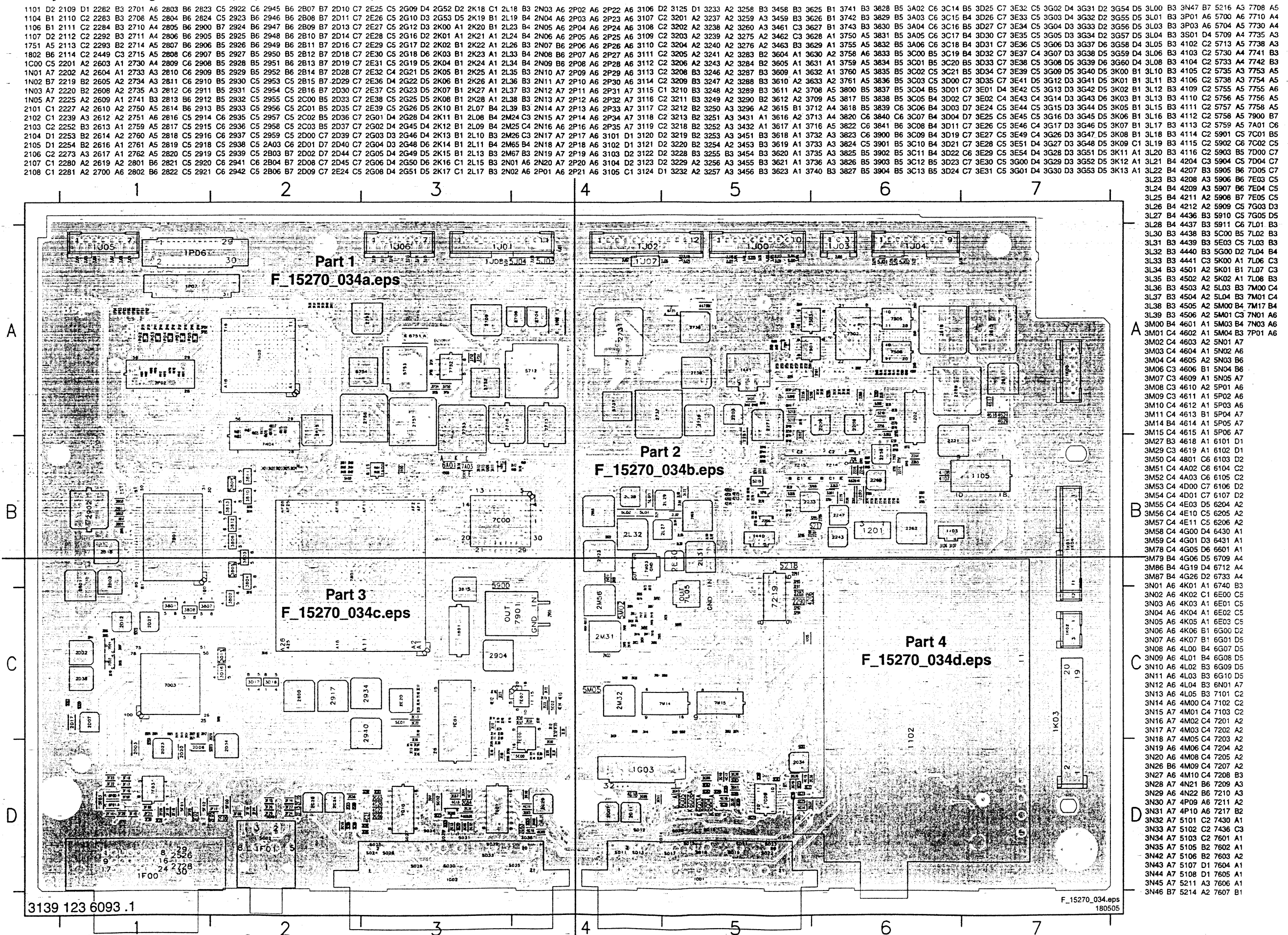
B20 & B21 PIXEL PLUS

| Item | LC4.3 non PIXEL+ | LC4.3 with PIXEL+ | 42PF732028 | LC4.8/LC4.9 non PIXEL+ | LC4.8/LC4.9 with PIXEL+ | Description                   |
|------|------------------|-------------------|------------|------------------------|-------------------------|-------------------------------|
| 1N02 |                  | V                 | V          | V                      | V                       | CON V 4P M 2.00 SM PH R       |
| 1N05 |                  | V                 | V          | V                      | V                       | OSC XTL SM 14M31818 15P OC R  |
| 1P06 | V                | V                 | V          | V                      | V                       | CON V 30P M 1.25 SM 1453230 R |
| 1P07 |                  | V                 | V          | V                      | V                       | CON H 31P F 1.25 SM FLWE R    |
| 2N01 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2N02 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2N03 |                  | V                 | V          | V                      | V                       | CER2 0402 X5R 6V3 1U PM20 R   |
| 2N04 |                  | V                 | V          | V                      | V                       | CER2 0402 X7R 50V 1N COL      |
| 2N05 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2N06 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2N07 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2N08 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2N09 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2N10 |                  | V                 | V          | V                      | V                       | CER1 0402 NP0 50V 100P COL    |
| 2N11 |                  | V                 | V          | V                      | V                       | CER1 0402 NP0 50V 100P COL    |
| 2N12 |                  | V                 | V          | V                      | V                       | CER1 0402 NP0 50V 100P COL    |
| 2N13 |                  | V                 | V          | V                      | V                       | CER1 0402 NP0 50V 100P COL    |
| 2N14 |                  | V                 | V          | V                      | V                       | CER1 0402 NP0 50V 100P COL    |
| 2N15 |                  | V                 | V          | V                      | V                       | CER1 0402 NP0 50V 100P COL    |
| 2N16 |                  | V                 | V          | V                      | V                       | CER2 0603 X5R 6V3 2U2 PM10 R  |
| 2P01 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P02 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P03 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P04 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P05 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P06 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P07 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P08 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P09 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P10 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P11 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P12 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P13 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P14 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P15 |                  | V                 | V          | V                      | V                       | ELCAP SM 16V 100U PM20 COL R  |
| 2P16 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P17 |                  | V                 | V          | V                      | V                       | CER2 0603 X5R 6V3 2U2 PM10 R  |
| 2P18 |                  | V                 | V          | V                      | V                       | CER2 0603 X5R 6V3 2U2 PM10 R  |
| 2P19 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P20 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P21 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P22 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P23 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P24 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P25 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P26 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P27 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P28 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P29 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P30 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P31 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P32 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P33 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P34 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 2P35 |                  | V                 | V          | V                      | V                       | CER2 0402 Y5V 16V 100N COL    |
| 3N01 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N02 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N03 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N04 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N05 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N06 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N07 |                  | V                 | V          | V                      | V                       | RST SM 0603 33K PM5 COL       |
| 3N08 |                  | V                 | V          | V                      | V                       | RST SM 0402 33K PM5 COL       |
| 3N09 |                  | V                 | V          | V                      | V                       | RST SM 0402 1K PM5 COL        |
| 3N10 |                  | V                 | V          | V                      | V                       | RST SM 0402 1K PM5 COL        |
| 3N11 |                  | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL       |
| 3N12 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N13 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N14 |                  | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL       |
| 3N15 |                  | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL       |
| 3N16 |                  | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL       |

| Item | LC4.3 non PIXEL+ | LC4.3 with PIXEL+ | 42PF732028 | LC4.8&LC4.9 non PIXEL+ | LC4.8&LC4.9 with PIXEL+ | Description                  |
|------|------------------|-------------------|------------|------------------------|-------------------------|------------------------------|
| 3N17 | V                | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL      |
| 3N18 | V                | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL      |
| 3N19 | V                | V                 | V          | V                      | V                       | RST SM 0402 10K PM5 COL      |
| 3N20 | V                | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL      |
| 3N21 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N22 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N23 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N24 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N25 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N26 | V                | V                 | V          | V                      | V                       | RST SM 0402 4K7 PM5 COL      |
| 3N27 | V                | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL      |
| 3N28 | V                | V                 | V          | V                      | V                       | RST SM 0633 180R PM5 COL     |
| 3N29 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N30 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N31 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N32 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N33 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N34 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N35 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N46 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3N47 | V                | V                 | V          | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3P01 | V                | V                 | V          | V                      | V                       | RST SM 0402 4K7 PM5 COL      |
| 3P03 | V                | V                 | V          | V                      | V                       | RST SM 0402 47R PM5 COL      |
| 3P04 |                  | V                 |            | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3P04 |                  | V                 |            | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 3P05 |                  | V                 |            | V                      | V                       | RST SM 0402 100R PM5 COL     |
| 3P05 |                  | V                 |            | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N01 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N02 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N03 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N04 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N05 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N06 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N07 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N08 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N09 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N10 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N11 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N12 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N13 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N14 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N15 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N16 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N17 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N18 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N19 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N20 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N21 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4N22 | V                | V                 | V          | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4P01 |                  | V                 |            | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4P02 |                  | V                 |            | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 4P07 |                  | V                 |            | V                      | V                       | RST SM 0402 JUMP .0R05 COL   |
| 5N01 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5N02 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5N03 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5N04 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5N05 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5P01 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5P02 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5P03 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5P04 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5P05 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 5N05 | V                | V                 | V          | V                      | V                       | FXDIND 0805 100MHZ 30R COL R |
| 6P01 | V                | V                 | V          | V                      | V                       | LED VS SM TLK33100 (VISH)    |
| 7N01 | V                | V                 | V          | V                      | V                       | IC SM EPC3ASIBN (ALT0) R     |
| 7N02 | V                | V                 | V          | V                      | V                       | IC SM EPT13256C8N (ALT0) Y   |
| 7N03 | V                | V                 | V          | V                      | V                       | TRA SIG SM BC847BS (PHSE) R  |
| 7N04 | V                | V                 | V          | V                      | V                       | IC SM THC63LVDF84B (THIN) R  |
| 7P01 | V                | V                 | V          | V                      | V                       | IC SM LF15A8VMT (ST00) R     |
| 7P02 | V                | V                 | V          | V                      | V                       | IC SM THC63LVDM38R (THIN) R  |

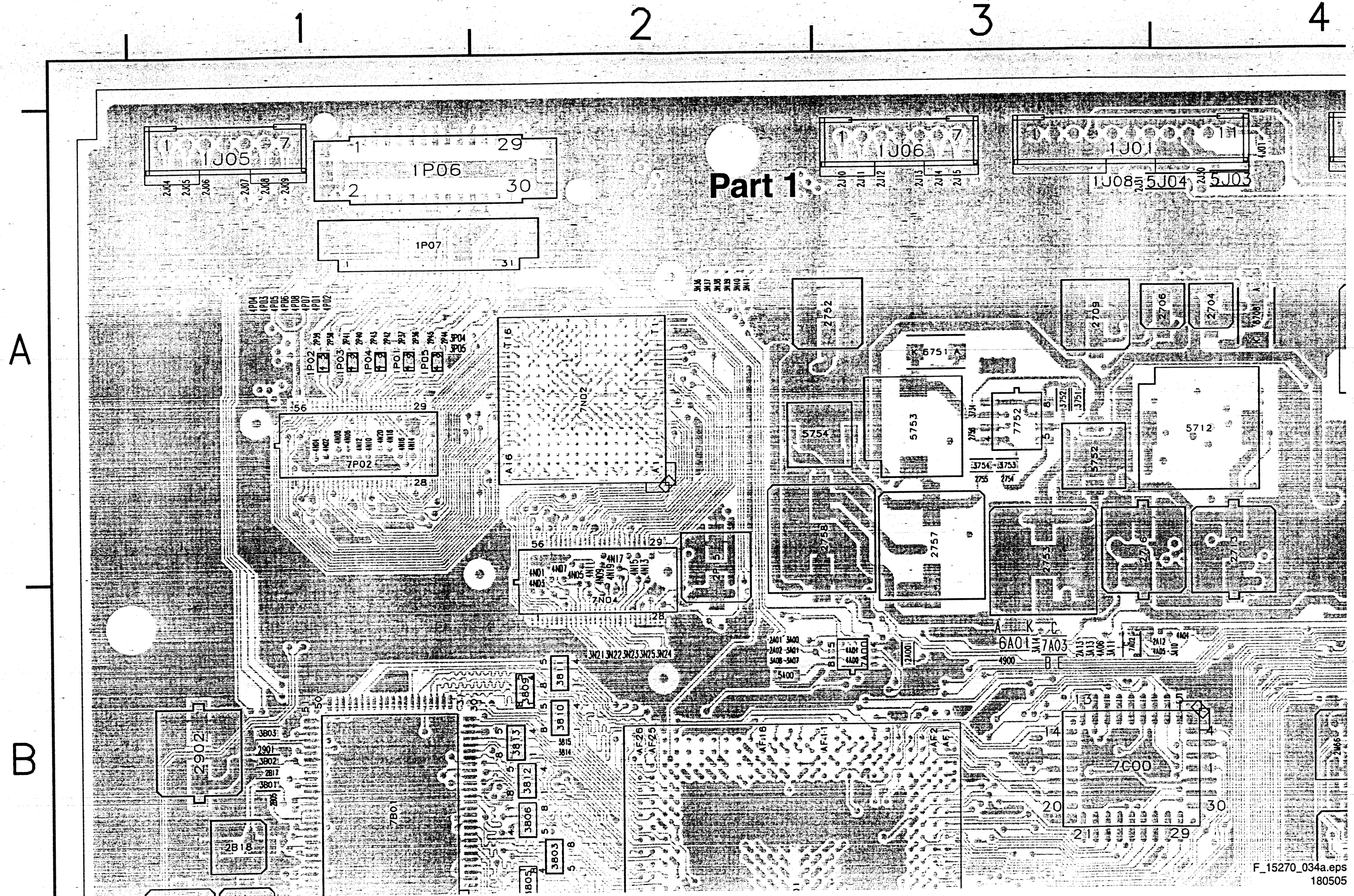


## Layout Small Signal Board (Top Side Overview)



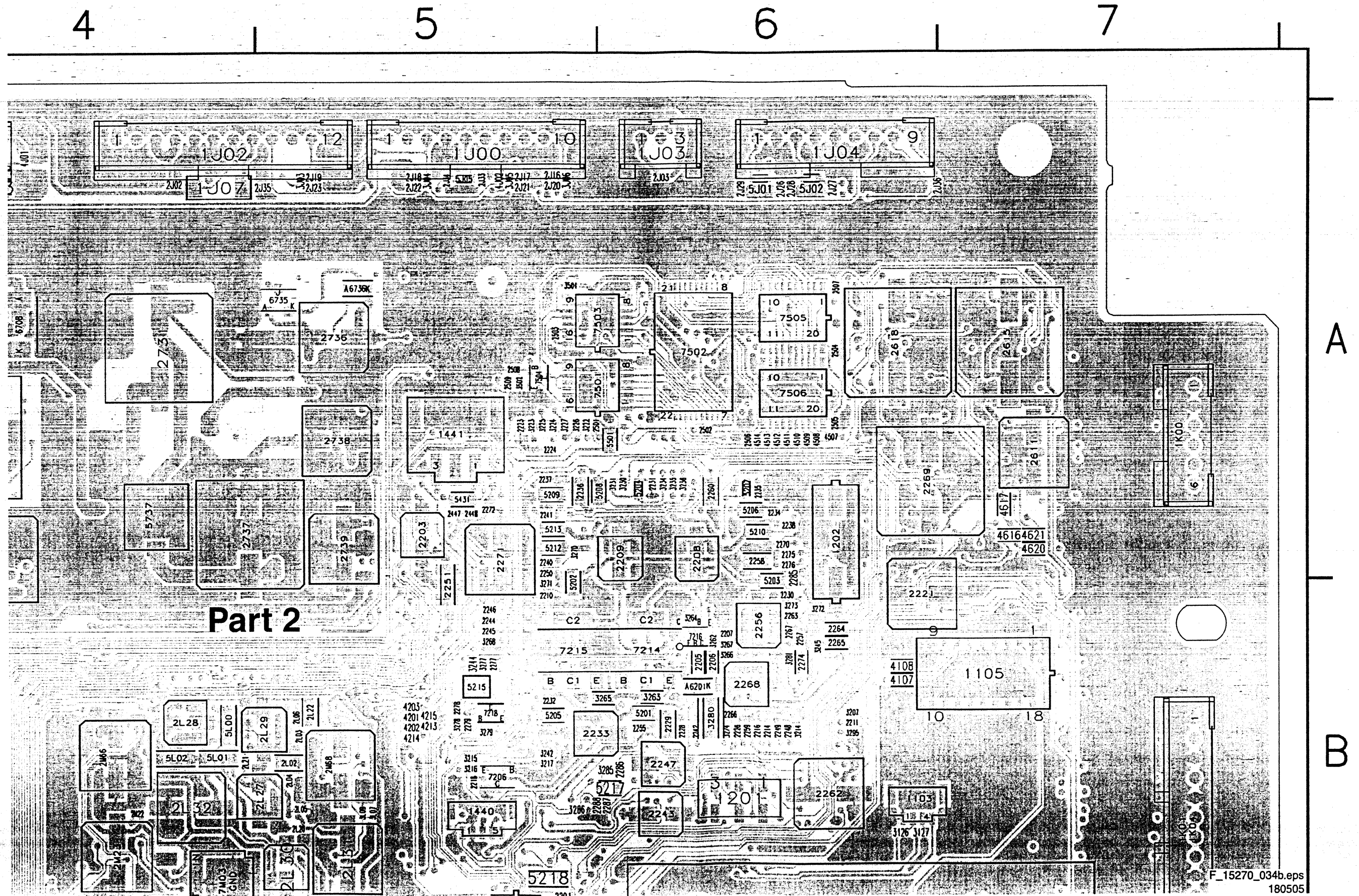


## Layout Small Signal Board (Top Side Part 1)



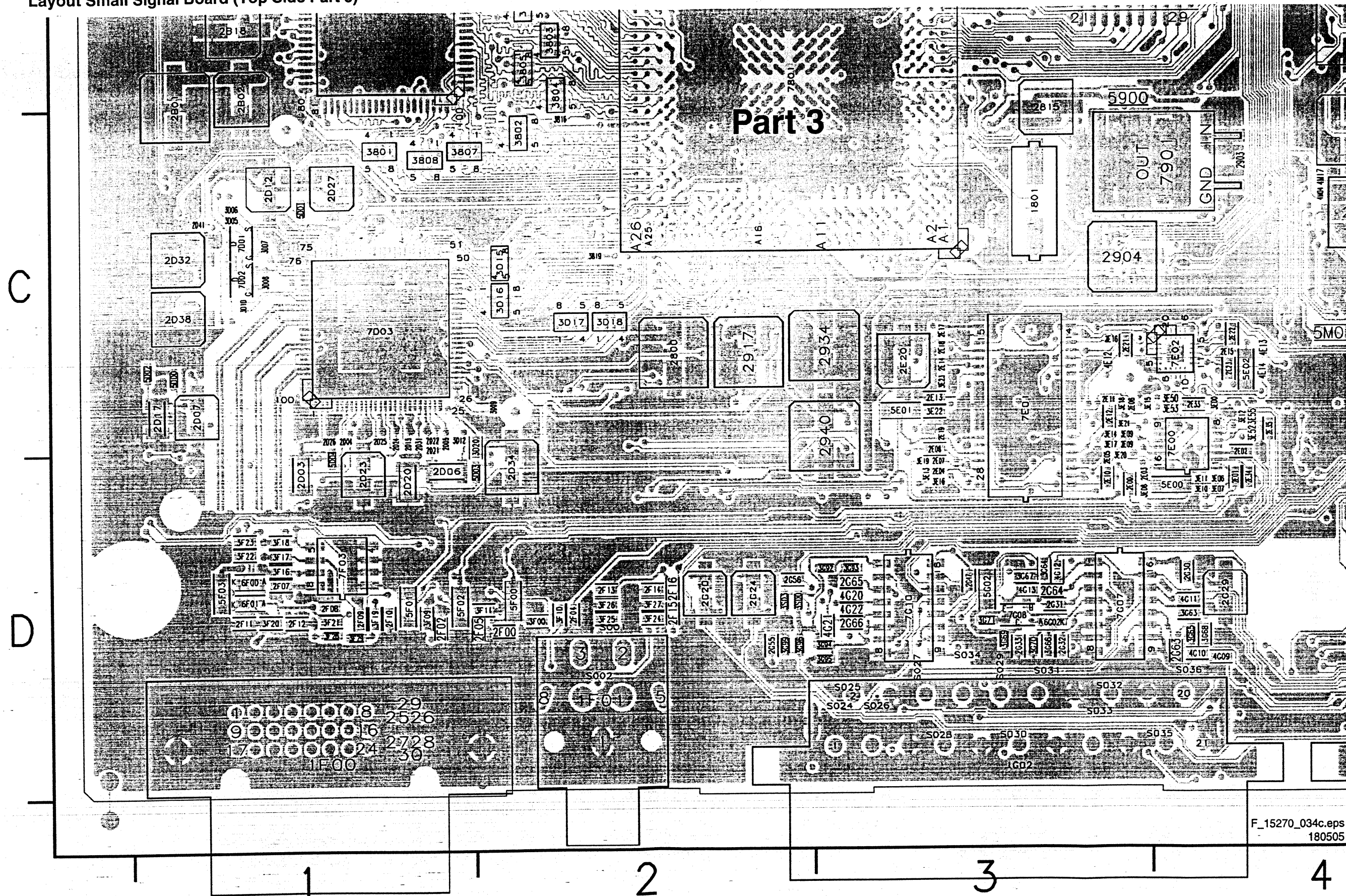


## Layout Small Signal Board (Top Side Part 2)



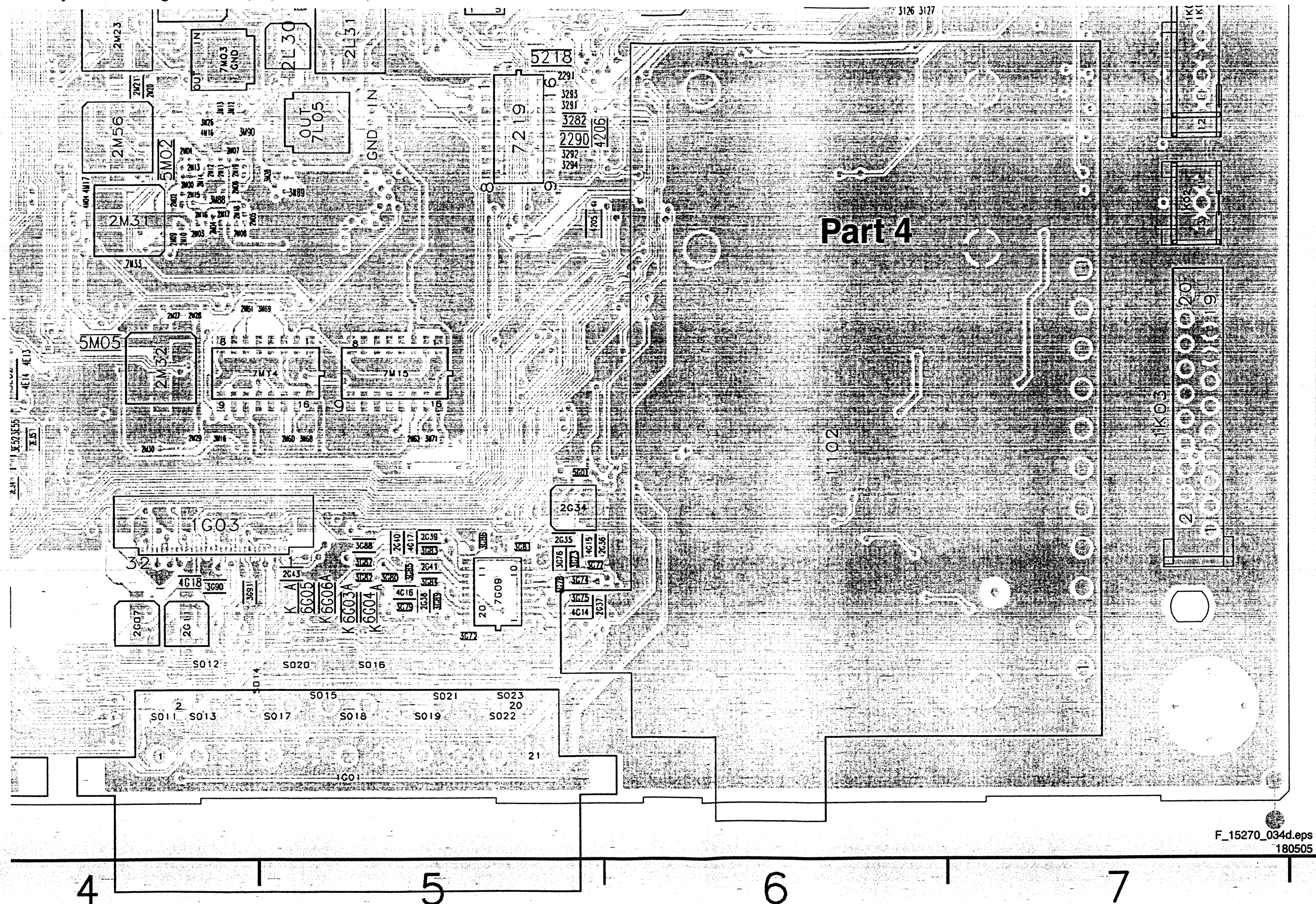


Layout Small Signal Board (Top Side Part 3)



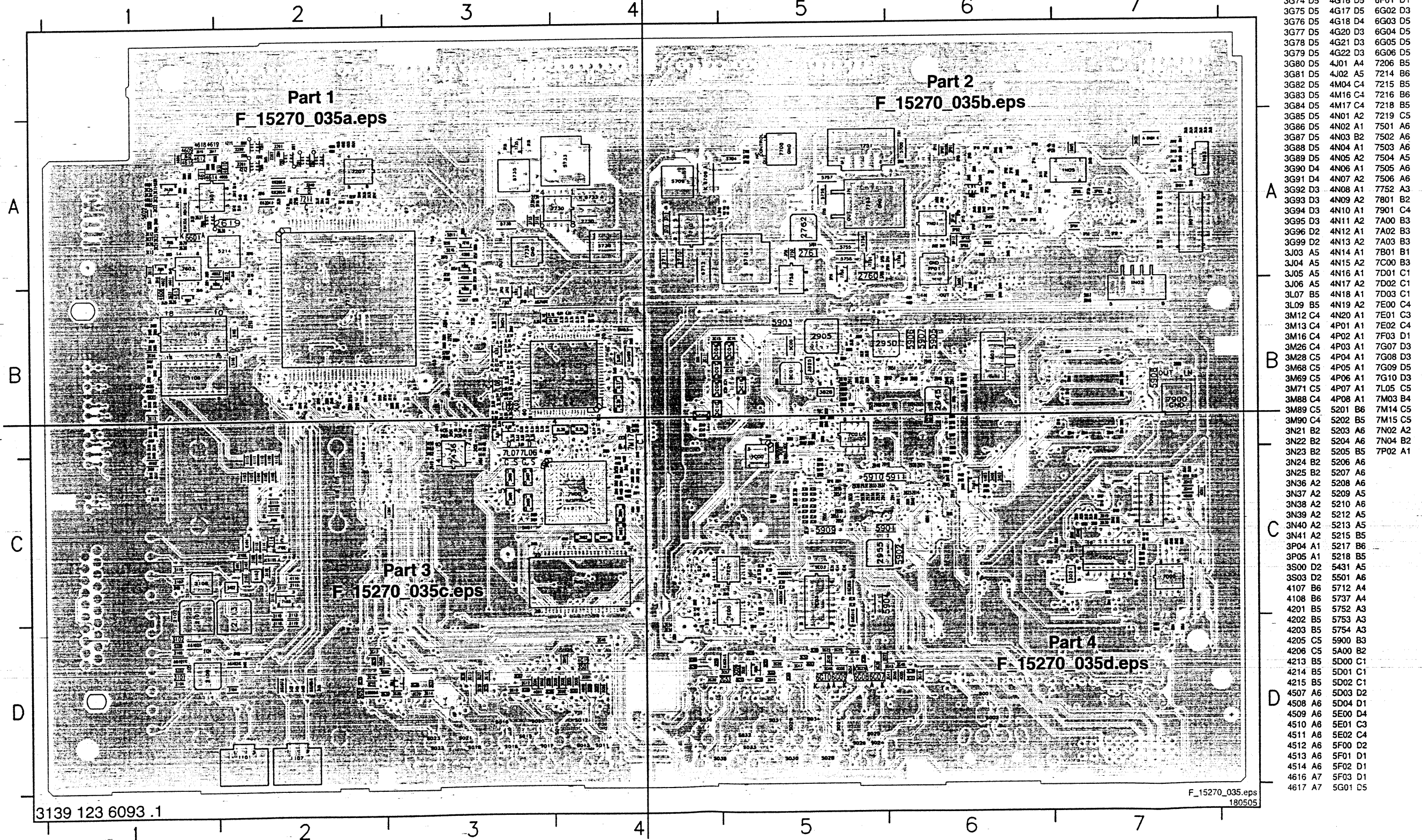


## Layout Small Signal Board (Top Side Part 4)





|                                                  |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--------------------------------------------------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|------|----|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Layout Small Signal Board (Bottom side PCB view) |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1102                                             | C6 | 1J04 | A6 | 2203 | A5 | 2230 | B6 | 2248 | B6 | 2269 | A6 | 2448 | A5 | 2716 | A3 | 2903 | C4 | 2D05 | C1 | 2D38 | C1 | 2E15 | C4 | 2F08 | D1 | 2G33 | D3 | 2J02 | A4 | 2J19 | A5 | 2L04 | B5 | 2M05 | C4 | 2M22 | B4 | 2P37 | A1 | 3223 | A5 | 3266 | B6 | 3292 | C5 | 3807 | C1 | 3A13 | B3 | 3E00 | C4 | 3E22 | C3 | 3F23 | D1 | 4620 | A7 | 5G02 | D3 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1103                                             | B6 | 1J05 | A1 | 2205 | B6 | 2231 | A6 | 2249 | B6 | 2270 | A6 | 2501 | A5 | 2731 | A4 | 2904 | C3 | 2D06 | D1 | 2D41 | C1 | 2E16 | C3 | 2F09 | D1 | 2G34 | D5 | 2J03 | A6 | 2J20 | A5 | 2L05 | B5 | 2M06 | C4 | 2M23 | B4 | 2P38 | A1 | 3224 | A5 | 3267 | B6 | 3293 | B5 | 3808 | C1 | 3A14 | B3 | 3E06 | D4 | 3E23 | C3 | 3F24 | D2 | 4621 | A7 | 5J01 | A6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1105                                             | B7 | 1J06 | A3 | 2206 | B6 | 2232 | B5 | 2250 | A5 | 2271 | A5 | 2502 | A6 | 2736 | A5 | 2917 | C2 | 2D07 | C1 | 2E01 | D4 | 2E18 | C3 | 2F11 | D1 | 2G36 | D5 | 2J05 | A1 | 2J22 | A5 | 2L20 | B5 | 2M08 | C4 | 2M28 | C4 | 2P40 | A1 | 3225 | A5 | 3268 | B5 | 3294 | C5 | 3809 | B2 | 3B01 | B1 | 3E07 | D4 | 3E50 | C4 | 3F25 | D2 | 4900 | B3 | 5J02 | A6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1201                                             | B6 | 1J07 | A4 | 2207 | B6 | 2233 | B5 | 2251 | B5 | 2272 | A5 | 2503 | A5 | 2737 | A4 | 2934 | C3 | 2D12 | C1 | 2E01 | D4 | 2E18 | C3 | 2F11 | D1 | 2G36 | D5 | 2J05 | A1 | 2J22 | A5 | 2L20 | B5 | 2M08 | C4 | 2M28 | C4 | 2P40 | A1 | 3226 | A5 | 3270 | A5 | 3295 | B6 | 3810 | B2 | 3B02 | B1 | 3E08 | D3 | 3E52 | C4 | 3F26 | D2 | 4A00 | B3 | 5J03 | A4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1202                                             | A6 | 1J08 | A3 | 2208 | A6 | 2234 | A6 | 2256 | B6 | 2275 | A6 | 2504 | A6 | 2738 | A5 | 2940 | C3 | 2D15 | C1 | 2E02 | D4 | 2E19 | C3 | 2F12 | D1 | 2G37 | D5 | 2J06 | A1 | 2J23 | A5 | 2L21 | B4 | 2M09 | C4 | 2M29 | C4 | 2P41 | A1 | 3227 | A5 | 3271 | B5 | 3501 | A5 | 3811 | B2 | 3B03 | B1 | 3E09 | C3 | 3E53 | C4 | 3F27 | D1 | 4A01 | B4 | 5J04 | A4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1440                                             | B5 | 1K00 | A7 | 2209 | A6 | 2235 | A6 | 2256 | B6 | 2275 | A6 | 2505 | A6 | 2739 | A5 | 2A00 | B3 | 2D17 | C1 | 2E03 | D3 | 2E20 | C3 | 2F13 | D2 | 2G38 | D5 | 2J07 | A1 | 2J26 | A6 | 2L22 | B5 | 2M10 | C4 | 2M30 | C4 | 2P42 | A1 | 3230 | A6 | 3272 | B6 | 3502 | A5 | 3812 | B2 | 3D05 | C1 | 3E10 | D4 | 3E55 | C4 | 3F28 | D2 | 4A02 | B4 | 5J05 | A5 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1441                                             | A5 | 1K01 | B7 | 2210 | B5 | 2236 | A5 | 2257 | B6 | 2276 | A6 | 2506 | A6 | 2752 | A3 | 2A01 | B2 | 2D18 | C1 | 2E04 | D3 | 2E21 | C3 | 2F14 | D2 | 2G39 | D5 | 2J08 | A1 | 2J27 | A6 | 2L27 | B5 | 2M11 | C4 | 2M31 | C4 | 2P43 | A1 | 3231 | A6 | 3273 | B6 | 3734 | A3 | 3813 | B2 | 3D06 | C1 | 3E11 | D4 | 3F00 | D2 | 3F29 | D1 | 4A05 | B4 | 5L01 | B4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1801                                             | C3 | 1K02 | C7 | 2211 | B6 | 2237 | A5 | 2258 | A6 | 2277 | B5 | 2507 | A6 | 2753 | A3 | 2A02 | B2 | 2D21 | C1 | 2E05 | D3 | 2E22 | C4 | 2F15 | D2 | 2G40 | D5 | 2J09 | A1 | 2J28 | A6 | 2L28 | B4 | 2M12 | C4 | 2M32 | C4 | 2P44 | A1 | 3234 | A8 | 3274 | B6 | 3751 | A3 | 3814 | B2 | 3D07 | C1 | 3E12 | C4 | 3F09 | D1 | 4A06 | B3 | 5L01 | B4 |      |    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1F00                                             | D1 | 1K03 | C7 | 2212 | B6 | 2238 | A6 | 2259 | B6 | 2278 | B5 | 2508 | A5 | 2754 | A3 | 2A12 | B4 | 2D22 | C1 | 2E06 | C3 | 2E23 | C4 | 2F16 | D2 | 2G41 | D5 | 2J10 | A3 | 2J29 | A6 | 2L29 | B5 | 2M13 | C4 | 2M33 | C4 | 2P45 | A1 | 3235 | A6 | 3277 | B5 | 3752 | A3 | 3815 | B2 | 3D08 | C1 | 3E13 | D3 | 3F10 | D2 | 3G64 | D3 | 4E12 | C3 | 5L02 | B4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |





## 4





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## Part 2

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**E**



## D

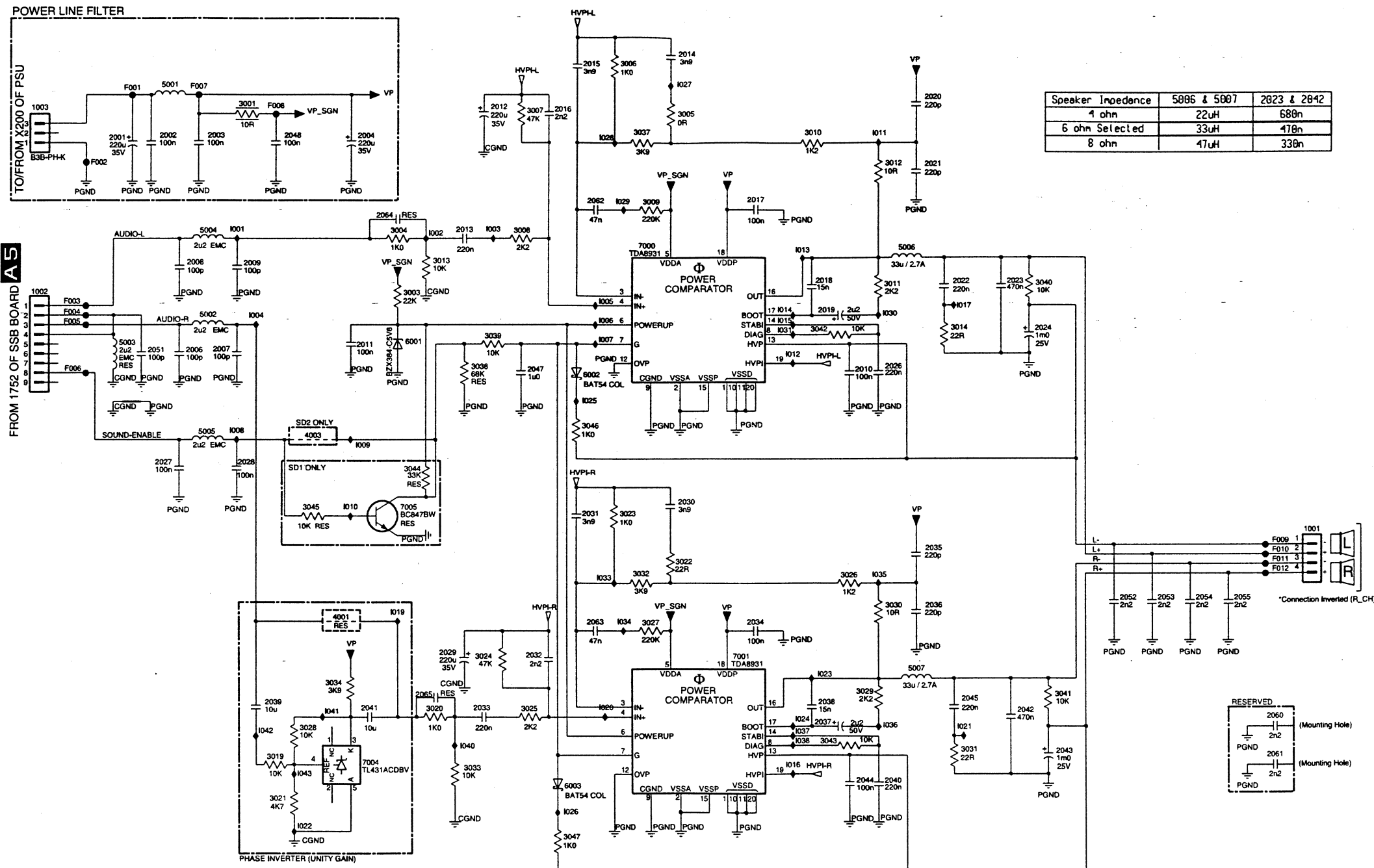




## Part 4

## Class D Audio Amplifier

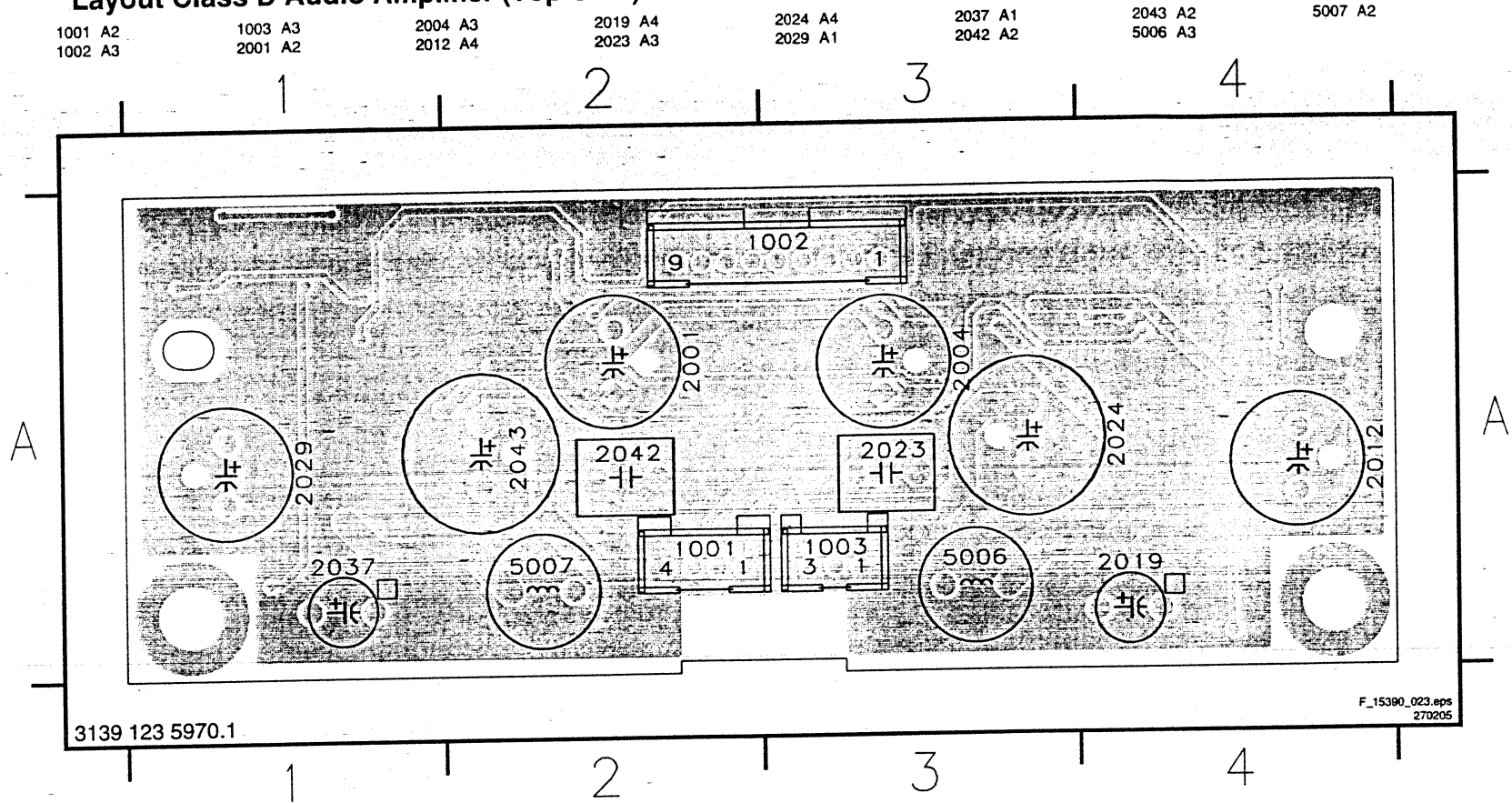
## CLASS D AUDIO AMPLIFIER



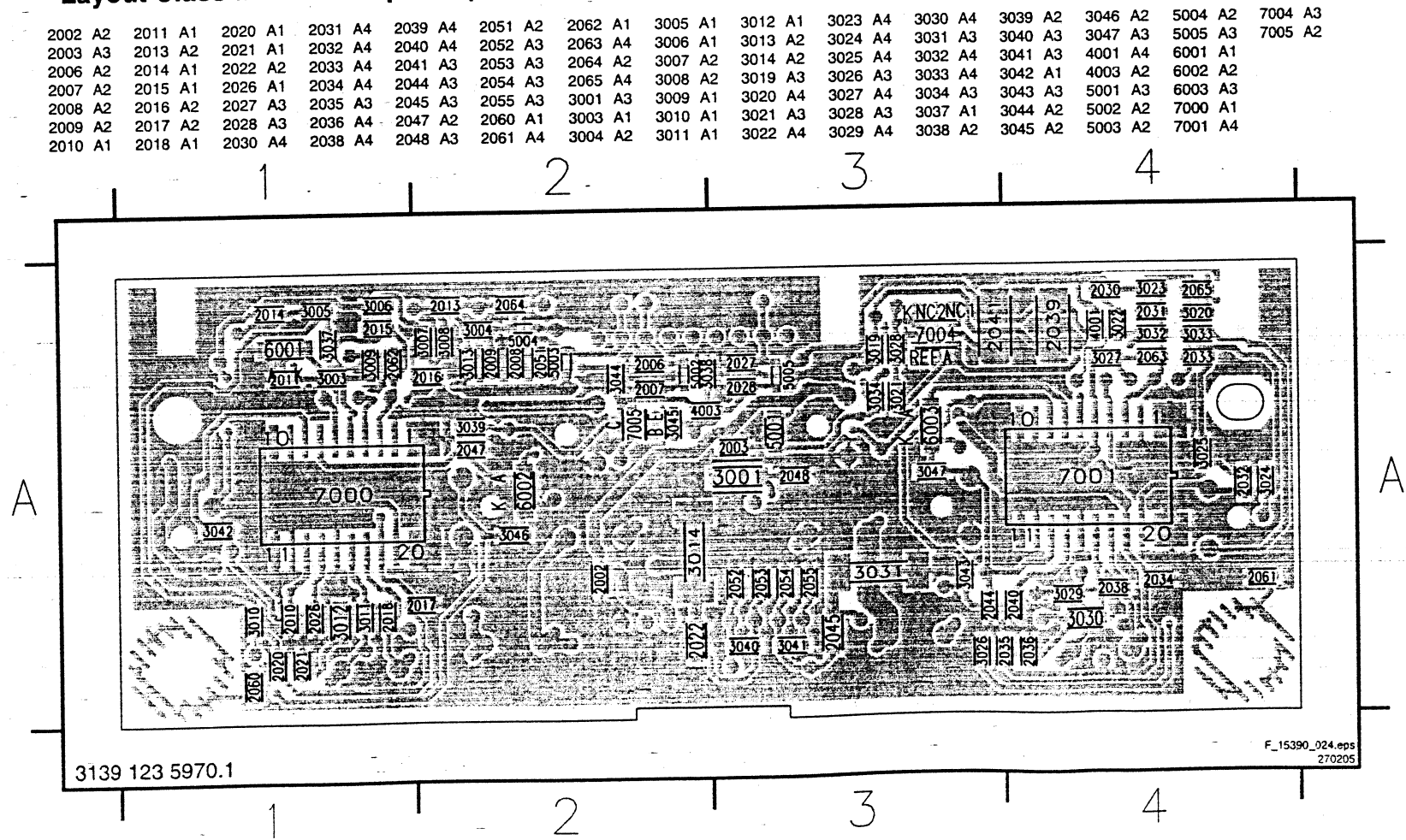
1001 E11  
1002 C2  
1003 A2  
2001 B2  
2002 B3  
2003 B3  
2004 B4  
2006 C3  
2007 C3  
2008 C3  
2009 C3  
2010 C8  
2011 C4  
2012 A5  
2013 B5  
2014 A7  
2015 A6  
2016 A6  
2017 B7  
2018 C8  
2019 C8  
2020 A8  
2021 B8  
2022 C9  
2023 C9  
2024 C9  
2026 C8  
2027 D3  
2028 D3  
2029 F5  
2030 D7  
2031 E6  
2032 F5  
2033 F5  
2034 E7  
2035 E8  
2036 E8  
2037 F8  
2038 F8  
2039 F8  
2040 G3  
2041 F4  
2042 F9  
2043 F9  
2044 G8  
2045 F9  
2047 C5  
2048 B4  
2051 C3  
2052 E10  
2053 E10  
2054 E10  
2055 E11  
2060 F11  
2061 F11  
2062 B6  
2063 E6  
2064 B4  
2065 F5  
3001 A3  
3003 C4  
3004 B4  
3005 B7  
3006 A6  
3007 B5  
3008 B5  
3009 B6  
3010 B8  
3011 C8  
3012 B8  
3013 C5  
3014 C9  
3019 F3  
3020 F5  
3021 G3  
3022 E7  
3023 E6  
3024 F5  
3025 F5  
3026 E8  
3027 E6  
3028 F4  
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3032 E6  
3033 F5  
3034 F4  
3037 B6  
3038 C5  
3039 C5  
3040 C9  
3041 F9  
3042 C8  
3043 F8  
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3045 D4  
3046 D6  
3047 G6  
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4003 D4

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5002 C3  
5003 C2  
5004 B3  
5005 D3  
5006 C8  
5007 F8  
6001 C4  
6002 C6  
6003 G6  
7000 C6  
7001 F7  
7004 F4  
7005 D4  
F001 A2  
F002 B2  
F003 C2  
F004 C2  
F005 C2  
F006 C2  
F007 A3  
F008 A3  
F009 E11  
F010 E11  
F011 E11  
F012 E11  
I001 B3  
I002 B5  
I003 B5  
I004 C3  
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I009 D4  
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I011 B8  
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I026 F99  
I026 F100

Layout Class D Audio Amplifier (Top Side)

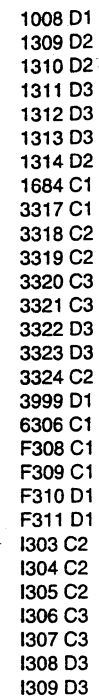


Layout Class D Audio Amplifier (Bottom Side)





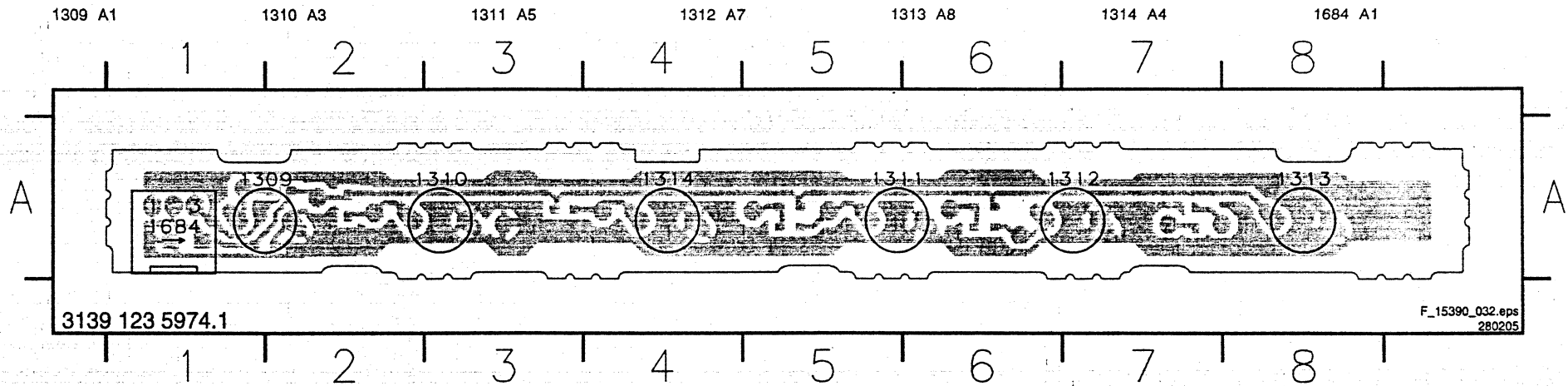
## KEYBOARD CONTROL



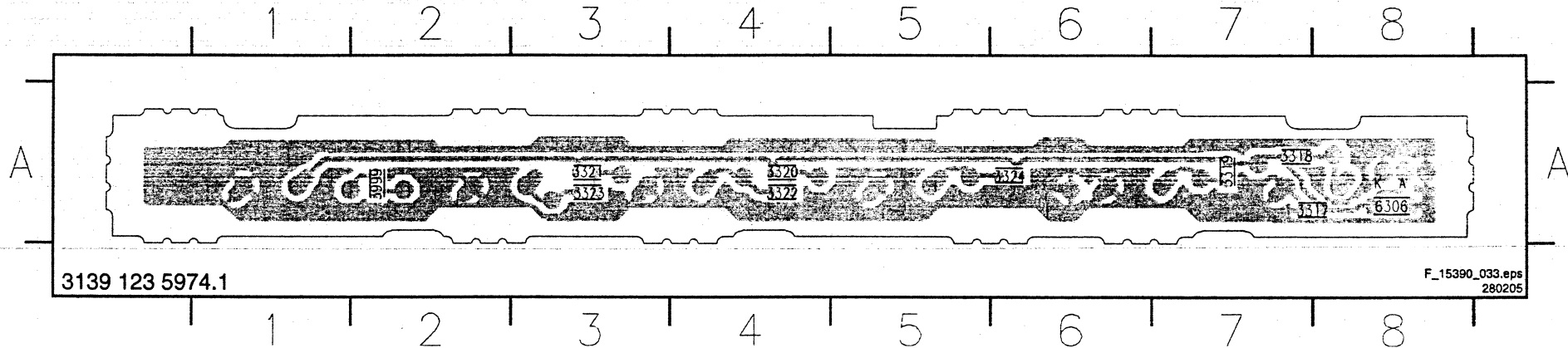
**Personal Notes:**

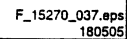


## Layout Keyboard Control Panel (Top Side)



## Layout Keyboard Control Panel (Bottom Side)



**G** SIDE-AV

1 2 3 4

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1301 1302 1303 1304 1305

9392 9390 9391

3139 123 5956.1

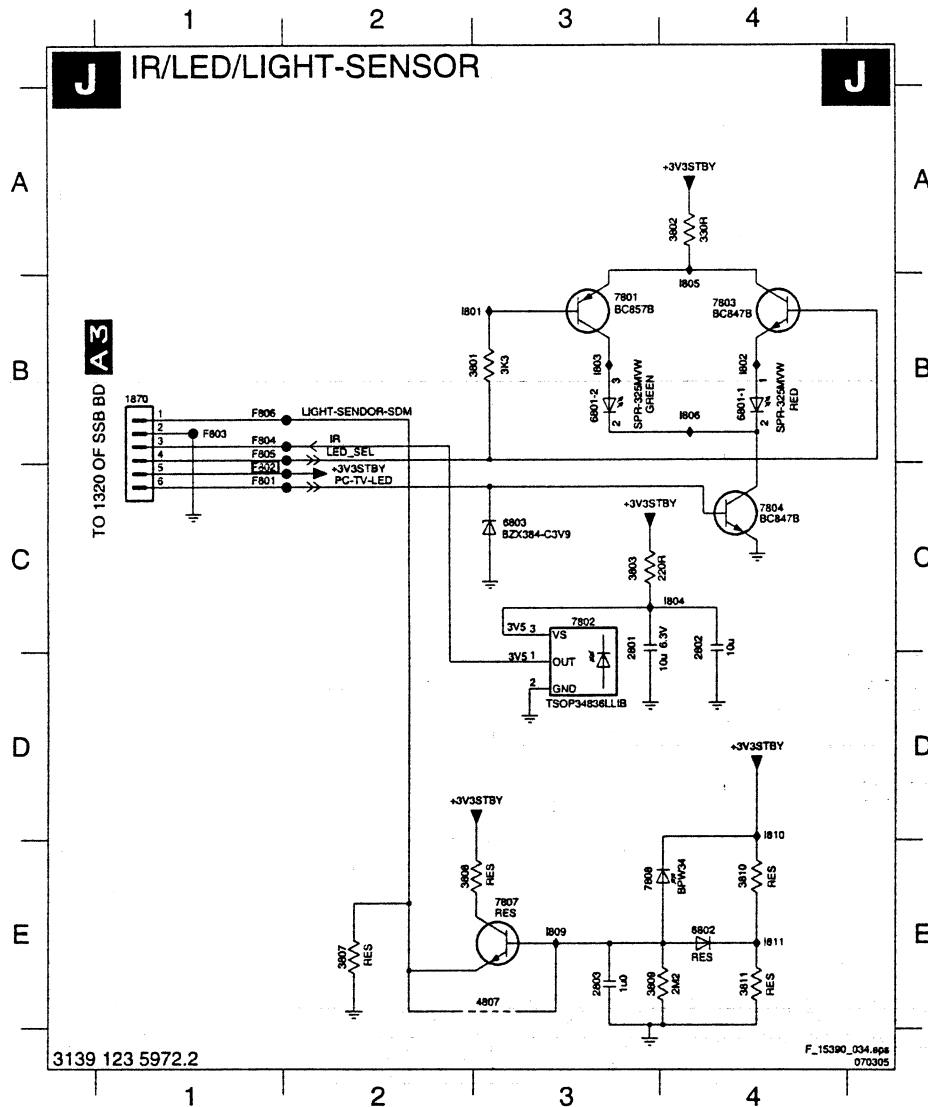
F\_15390\_028.eps 280205

3139 123 5956.1

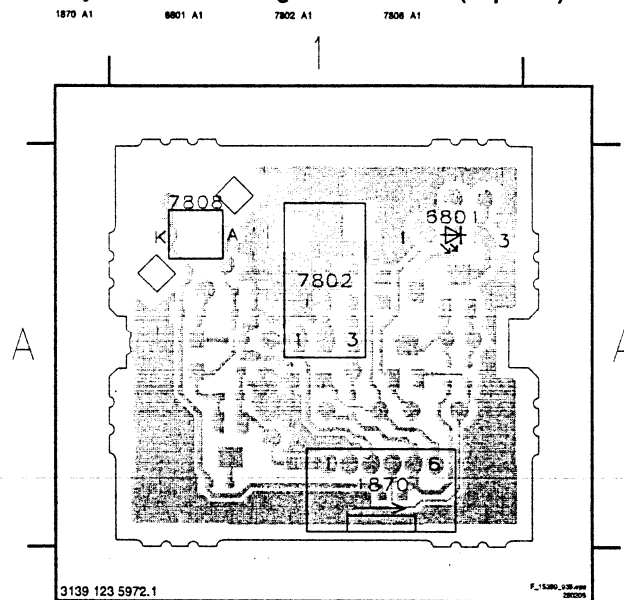
F\_15390\_029.eps  
280205

## IR-LED and Light Sensor Panel

|         |         |         |           |         |         |         |         |         |         |
|---------|---------|---------|-----------|---------|---------|---------|---------|---------|---------|
| 1870 B1 | 3801 B2 | 3808 E2 | 4807 E3   | 6803 C3 | 7804 C4 | F802 C1 | F806 B1 | I804 C4 | I810 D4 |
| 2801 C3 | 3802 A4 | 3809 E3 | 6801-1 B4 | 7801 B3 | 7807 E3 | F803 B1 | I801 B2 | I805 B4 | I811 E4 |
| 2802 C4 | 3803 C3 | 3810 E4 | 6801-2 B3 | 7802 C3 | 7808 E3 | F804 B1 | I802 B4 | I806 B4 |         |
| 2803 E3 | 3807 E2 | 3811 E4 | 6802 E4   | 7803 B4 | F801 C1 | F805 B1 | I803 B3 | I809 E3 |         |

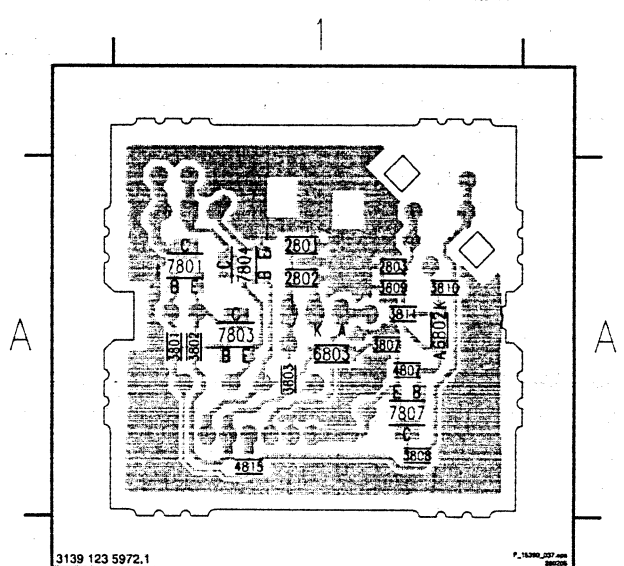


## Layout IR-LED and Light Sensor Panel (Top Side)



## Layout IR-LED and Light Sensor Panel (Bottom Side)

2801 A1 2803 A1 3802 A1 3807 A1 3809 A1 3811 A1 4815 A1 6803 A1 7803 A1 7807 A1  
2802 A1 3801 A1 3803 A1 3808 A1 3810 A1 4807 A1 6802 A1 7801 A1 7804 A1





**Personal Notes:**

## 8. Alignments

### Index of this chapter:

- 8.1 General Alignment Conditions
- 8.2 Hardware Alignments
- 8.3 Software Alignments

**Note:** Figures below can deviate slightly from the actual situation, due to the different set executions.

**General:** The Service Default Mode (SDM) and Service Alignment Mode (SAM) are described in chapter 5. Menu navigation is done with the Cursor Up, Down, Left or Right keys of the remote control transmitter.

### 8.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

Mains voltage and frequency: 100-240 V / 50/60 Hz.  
Allow the set to warm up for approximately 10 minutes.  
Test probe: Ri > 10 MΩ; Ci < 2.5 pF.

### 8.2 Hardware Alignments

There are no hardware alignments foreseen for the LCD-TV.

### 8.3 Software Alignments

With the software alignments of the Service Alignment Mode (SAM) the geometry, white tone and tuner (IF) can be aligned. To store the data: Use the RC button Menu to switch to the main menu and next, switch to 'Stand-by' mode.

#### 8.3.1 SAM Menu

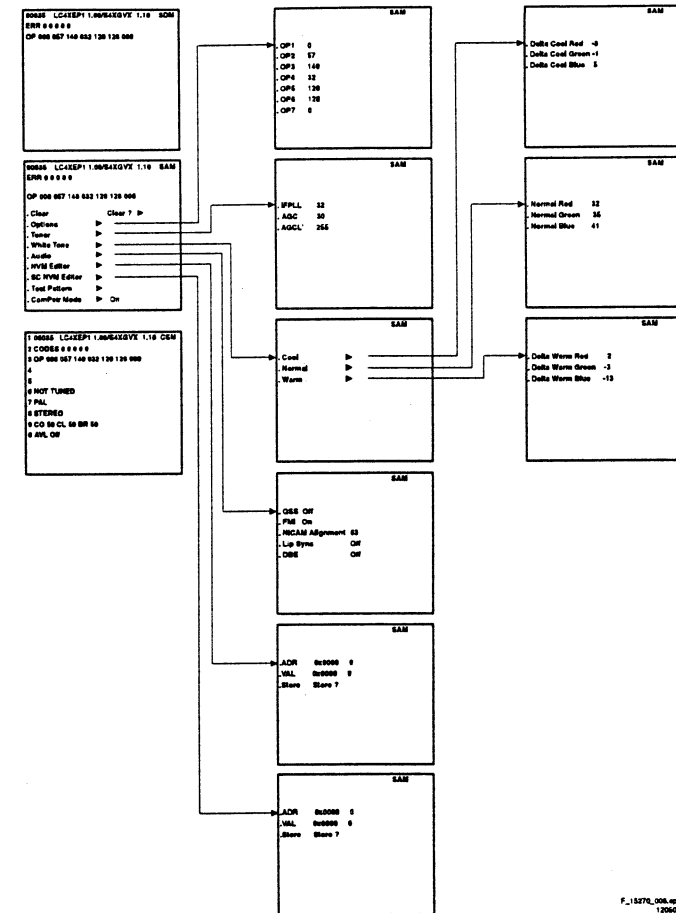


Figure 8-1 Overview SAM menu.

#### 8.3.2 Tuner Adjustment

AGC (RF AGC Take Over Point)

- Activate the SAM menu.
- Go to the sub-menu Tuner.
- Select the AGC sub-menu.
- Adjust the AGC value to AGC = 27.
- Adjust the AGC L' value to AGC L' = 27 (Europe only).
- Adjust the IFPLL value to IFPLL = 32 (Europe only).
- Switch the set to standby to store the data.

#### 8.3.3 DCXO (Digital Xtal Oscillator) Alignment (for NICAM sets only)

- Input a Colour bar signal with a colour subcarrier frequency of 4.43 MHz on SCART1 or SCART2.
- Select as a signal source EXT1 or AV1.
- Go to the SAM menu and select Audio.
- Activate DCXO Alignment and wait until this process has finished (DONE).
- Check if the NICAM audio reception is OK, if not: repeat the procedure.
- Switch the set to standby to store the data.

## 8.3.4 ADC Gain, Grey Scale Alignment &amp; Panel Size Settings

The table below shows a number of NVM settings used for each model of TV set. Be sure to use the correct editor in the SAM menu (NVM Editor or SC NVM Editor), because the first one is used for the Hercules NVM, and the second one for the SCALER (SC) part of the TV set. For further important NVM settings, see also the other NVM tables elsewhere in this manual.

## Caution:

- Do not change the NVM settings without understanding the function of each setting, because incorrect NVM settings may seriously hamper the correct functioning of the TV set!
- Do not change the Scaler NVM settings, as this will hamper the DVI functionality of the TV set!
- Always note down the existing NVM settings, before changing the settings. This will enable you to return to the original settings, if the new settings turn out to be incorrect.

Table 8-1 ADC gain, grey scale alignment &amp; panel size settings

| SDTV ADC Gain settings: Use the NVM Editor in SAM to set these values in the Hercules NVM   |                                      |                                                    |             |             |                             |                                |
|---------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------|-------------|-------------|-----------------------------|--------------------------------|
| Setting                                                                                     | Hercules NVM Address (decimal value) | These models are with ADC & Columbus 3D Combfilter |             |             | Without ADC & 3D Combfilter |                                |
|                                                                                             |                                      | 32PF7320/10                                        | 32PF5320/10 | 26PF5320/10 | 26PF4310/10                 | Settings Range (decimal value) |
| NVM_ADC_GAIN_R                                                                              | 006                                  | 110                                                | 110         | 110         | N/A                         | N/A                            |
| NVM_ADC_GAIN_G                                                                              | 007                                  | 180                                                | 180         | 180         | 150                         | 200                            |
| NVM_ADC_GAIN_B                                                                              | 008                                  | 110                                                | 110         | 110         | N/A                         | N/A                            |
| SDTV Greyscale settings: Use the SC NVM Editor in SAM to set these values in the Scaler NVM |                                      |                                                    |             |             |                             |                                |
| Setting                                                                                     | Scaler NVM Address (decimal value)   | These models are with ADC & Columbus 3D Combfilter |             |             | Without ADC & 3D Combfilter |                                |
|                                                                                             |                                      | 32PF7320/10                                        | 32PF5320/10 | 26PF5320/10 | 26PF4310/10                 | Settings Range (decimal value) |
| ADC_RED_OFFSET2                                                                             | 338                                  | 080                                                | 080         | 080         | 080                         | 050 - 110                      |
| ADC_GRN_OFFSET2                                                                             | 339                                  | 080                                                | 080         | 080         | 080                         | 050 - 110                      |
| ADC_BLU_OFFSET2                                                                             | 340                                  | 080                                                | 080         | 080         | 080                         | 050 - 110                      |
| ADC_RED_GAIN                                                                                | 341                                  | 065                                                | 065         | 065         | 040                         | 065                            |
| ADC_GRN_GAIN                                                                                | 343                                  | 065                                                | 065         | 065         | 040                         | 065                            |
| ADC_BLU_GAIN                                                                                | 345                                  | 065                                                | 065         | 065         | 040                         | 065                            |
| PC Greyscale settings                                                                       |                                      |                                                    |             |             |                             |                                |
| Setting                                                                                     | Scaler NVM Address (decimal value)   | These models are with ADC & Columbus 3D Combfilter |             |             | Without ADC & 3D Combfilter |                                |
|                                                                                             |                                      | 32PF7320/10                                        | 32PF5320/10 | 26PF5320/10 | 26PF4310/10                 | Settings Range (decimal value) |
| ADC_RED_OFFSET2                                                                             | 325                                  | 080                                                | 080         | 080         | 080                         | 040 - 080                      |
| ADC_GRN_OFFSET2                                                                             | 326                                  | 080                                                | 080         | 080         | 080                         | 040 - 080                      |
| ADC_BLU_OFFSET2                                                                             | 327                                  | 080                                                | 080         | 080         | 080                         | 040 - 080                      |
| ADC_RED_GAIN                                                                                | 328                                  | 200                                                | 200         | 200         | 180                         | 270                            |
| ADC_GRN_GAIN                                                                                | 330                                  | 200                                                | 200         | 200         | 180                         | 270                            |
| ADC_BLU_GAIN                                                                                | 332                                  | 200                                                | 200         | 200         | 180                         | 270                            |
| HD Greyscale settings                                                                       |                                      |                                                    |             |             |                             |                                |
| Setting                                                                                     | Scaler NVM Address (decimal value)   | These models are with ADC & Columbus 3D Combfilter |             |             | Without ADC & 3D Combfilter |                                |
|                                                                                             |                                      | 32PF7320/10                                        | 32PF5320/10 | 26PF5320/10 | 26PF4310/10                 | Settings Range (decimal value) |
| ADC_RED_OFFSET2                                                                             | 351                                  | 064                                                | 064         | 064         | 050                         | 090                            |
| ADC_GRN_OFFSET2                                                                             | 352                                  | 062                                                | 062         | 062         | 050                         | 080                            |
| ADC_BLU_OFFSET2                                                                             | 353                                  | 064                                                | 064         | 064         | 050                         | 080                            |
| ADC_RED_GAIN                                                                                | 354                                  | 159                                                | 159         | 159         | 120                         | 200                            |
| ADC_GRN_GAIN                                                                                | 356                                  | 144                                                | 144         | 144         | 120                         | 200                            |
| ADC_BLU_GAIN                                                                                | 358                                  | 147                                                | 147         | 147         | 120                         | 200                            |
| Panel size settings                                                                         |                                      |                                                    |             |             |                             |                                |
| Setting                                                                                     | Scaler NVM Address (decimal value)   | WXGA 16x9 panel, brand: LPL                        |             |             | WXGA 15x9 panel             |                                |
|                                                                                             |                                      | 32PF7320/10                                        | 32PF5320/10 | 26PF5320/10 | 26PF4310/10, brand: GDI     | 26PF4310/10, brand: LPL        |
| NVM_PANEL_SEL                                                                               | 320                                  | 015                                                | 015         | 026         | 025                         | 027                            |

## 8.3.5 Sound

- For NICAM sets: see paragraph 8.3.3.
- For other sets: No adjustments needed for sound.

## 8.3.6 Options

Options OP1...OP7 in the SAM menu can be used for quickly restoring 64 features or settings of the SCALER part of the TV set to their original default factory values (8 groups of 8 features/settings each). When the decimal value of one option byte OP1...OP7 is changed (see the first table below) then a group of 8 bits, representing 8 SCALER options or features, is changed as well (see the second table below for a detailed description of the features or settings that are changed). The second table shows which option byte (OP1...OP7) represents which group of 8 option bits. Each bit (0...7) switches a particular SCALER feature or setting ON or OFF, depending on its value (1 or 0). It is also possible to change the features or settings mentioned in the second table directly at bit level, by means of the SC (i.e., SCALER) NVM Editor in the SAM menu. In the SC NVM Editor, first the correct NVM address (ADR) has to be entered, then the correct value (VAL, 1 or 0) for each bit (see second table), and finally the settings have to be stored (STORE). For quickly restoring the SCALER part of the TV set to its original factory settings, however, it is more convenient to simply enter the default factory settings OP1...OP7 that are given in the first table below. How to do this, is described in the next paragraph.

## How to Change an Option Byte

As has been explained above, an Option byte (OP) represents a number of different SCALER options. Changing these bytes directly makes it possible to set all SCALER options very fast. All options are controlled via seven option bytes. Select the option byte (OP1... OP7) with the Menu Up/ Down keys, and enter the new (decimal) value. For the correct Factory Default settings, see the first table below. For more detailed information, see the second table.

Leaving the Option submenu saves the changes in the Option Byte settings. Some changes will only take effect after the set has been switched "off" and "on" with the AC power switch (cold start).

Table 8-2 Option codes OP1...OP7

| Option table for quickly restoring the SCALER to its Factory Default settings |              |                                                      |             |             |
|-------------------------------------------------------------------------------|--------------|------------------------------------------------------|-------------|-------------|
| Option                                                                        | Model number | 32PF7320/10                                          |             |             |
|                                                                               |              | 32PF5320/10                                          | 26PF5320/10 | 26PF4310/10 |
| OP1                                                                           | 152          | 152                                                  | 152         | 152         |
| OP2                                                                           | 37           | 37                                                   | 37          | 37          |
| OP3                                                                           | 76           | 15                                                   | 15          | 14          |
| OP4                                                                           | 113          | 113                                                  | 113         | 113         |
| OP5                                                                           | 252          | 252                                                  | 252         | 252         |
| OP6                                                                           | 27           | 27                                                   | 27          | 27          |
| OP7                                                                           | 19           | 19                                                   | 19          | 3           |
| Options (can be changed only via the SAM menu)                                |              | Total decimal value for each option per model number |             |             |

## How to Change Options at Bit Level

If you wish to know which features or settings of the SCALER are changed via OP1...OP7, or if you want to change each option or feature bit by bit, use the more detailed table below. Note: the table below contains only part of the NVM settings that can be changed (i.e., only part of the SCALER settings). A second range of settings and features, belonging to the HERCULES part of the TV set, can be found in Chapter 5 of this manual, in Table 5-2. The HERCULES NVM settings mentioned there can only be changed via the NVM editor, and not via the SCALER "Options" OP1...OP7. For further settings,

see also the NVM settings in the Table "ADC Gain, Grey scale alignment & panel size settings" elsewhere in this manual.

**Table 8-3 Option codes in detail, at bit level**

| Option byte & bit Table for restoring the SCALER to its original Factory Default settings via the SC NVM Editor in the SAM menu |                                                        |              |             |             |             |             |             |             |             |
|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|                                                                                                                                 |                                                        | Model number | 32PF7320/18 | 32PF5330/10 | 26PF5330/10 | 26PF4310/10 | 26PF4310/10 | 26PF4310/10 | 26PF4310/10 |
| OP1                                                                                                                             | Description of feature/option to be switched ON or OFF |              |             |             |             |             |             |             |             |
| bit 7 (msb)                                                                                                                     | OP_PHILIPS_TUNER                                       |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 6                                                                                                                           | OP_FM_RADIO                                            |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 5                                                                                                                           | OP_LNA                                                 |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 4                                                                                                                           | OP_ATS // for EU                                       |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 3                                                                                                                           | OP_ACI                                                 |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 2                                                                                                                           | OP_TX_CHIP                                             |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 1                                                                                                                           | OP_VIRGIN_MODE                                         |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 0 (lsb)                                                                                                                     | OP_CHINA                                               |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Total DEC Value                                                                                                                 |                                                        |              | 152         | 152         | 152         | 152         | 152         | 152         | 152         |
| Total HEX Value                                                                                                                 |                                                        |              | 98          | 98          | 98          | 98          | 98          | 98          | 98          |
| OP2                                                                                                                             |                                                        |              |             |             |             |             |             |             |             |
| bit 7 (msb)                                                                                                                     | OP_SC                                                  |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 6                                                                                                                           | OP_IBEX                                                |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 5                                                                                                                           | OP_CHANNEL_NAMING                                      |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 4                                                                                                                           | OP_LTI (Lum. transient improvmt)                       |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 3                                                                                                                           | OP_HLT                                                 |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 2                                                                                                                           | OP_FINE_TUNING                                         |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 1                                                                                                                           | OP_PIP_PHILIPS_TUNER                                   |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 0 (lsb)                                                                                                                     | OP_HUE                                                 |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total DEC Value                                                                                                                 |                                                        |              | 37          | 37          | 37          | 37          | 37          | 37          | 37          |
| Total HEX Value                                                                                                                 |                                                        |              | 25          | 25          | 25          | 25          | 25          | 25          | 25          |
| OP3                                                                                                                             |                                                        |              |             |             |             |             |             |             |             |
| bit 7 (msb)                                                                                                                     | OP_EW_FUNCTION                                         |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 6                                                                                                                           | OP_PIXEL_PLUS                                          |              | 1           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 5                                                                                                                           | OP_PIP_SPITTER // temp                                 |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 4                                                                                                                           | OP_SPITTER // temp                                     |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 3                                                                                                                           | OP_VIRTUAL_DOLBY                                       |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 2                                                                                                                           | OP_WIDE_SCREEN                                         |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 1                                                                                                                           | OP_WSSB                                                |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 0 (lsb)                                                                                                                     | OP_OP_MES // OP_MES - 5/6 local buttons implementation |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total DEC Value                                                                                                                 |                                                        |              | 78          | 15          | 15          | 14          | 14          | 14          | 14          |
| Total HEX Value                                                                                                                 |                                                        |              | 4F          | 0F          | 0F          | 0E          | 0E          | 0E          | 0E          |
| OP4                                                                                                                             |                                                        |              |             |             |             |             |             |             |             |
| bit 7 (msb)                                                                                                                     | OP_LIP_SYNC                                            |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 6                                                                                                                           | OP_HD                                                  |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 5                                                                                                                           | OP_ULTRA_BASS                                          |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 4                                                                                                                           | OP_DELTA_VOLUME                                        |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 3                                                                                                                           | OP_TAIWAN_KOREA                                        |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 2                                                                                                                           | OP_VOLUME_LIMITER                                      |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 1                                                                                                                           | OP_STEREO_DBX                                          |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 0 (lsb)                                                                                                                     | OP_STEREO_NICAM_CS                                     |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total DEC Value                                                                                                                 |                                                        |              | 113         | 113         | 113         | 113         | 113         | 113         | 113         |
| Total HEX Value                                                                                                                 |                                                        |              | 71          | 71          | 71          | 71          | 71          | 71          | 71          |
| OP5                                                                                                                             |                                                        |              |             |             |             |             |             |             |             |
| bit 7 (msb)                                                                                                                     | OP_AV1                                                 |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 6                                                                                                                           | OP_AV2                                                 |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 5                                                                                                                           | OP_AV3                                                 |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 4                                                                                                                           | OP_DVI                                                 |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 3                                                                                                                           | OP_SVHS2                                               |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 2                                                                                                                           | OP_SVHS3                                               |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 1                                                                                                                           | OP_HOTEL_MODE                                          |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 0 (lsb)                                                                                                                     | OP_SIMPLY_FACTORY.OP_BYSC_AVSTEREO                     |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| Total DEC Value                                                                                                                 |                                                        |              | 252         | 252         | 252         | 252         | 252         | 252         | 252         |
| Total HEX Value                                                                                                                 |                                                        |              | FC          | FC          | FC          | FC          | FC          | FC          | FC          |
| OP6                                                                                                                             |                                                        |              |             |             |             |             |             |             |             |
| bit 7 (msb)                                                                                                                     | OP_PERSONAL_ZAPPING                                    |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 6                                                                                                                           | OP_SMART_SURF                                          |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 5                                                                                                                           | OP_PMTTRAP                                             |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 4                                                                                                                           | OP_CCMBFILTER                                          |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 3                                                                                                                           | OP_ACTIVE_CONTROL                                      |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 2                                                                                                                           | OP_AUDIO_TEXT                                          |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 1                                                                                                                           | OP_LIGHT_SENSOR                                        |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 0 (lsb)                                                                                                                     | OP_TWIN_TEXT                                           |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total DEC Value                                                                                                                 |                                                        |              | 27          | 27          | 27          | 27          | 27          | 27          | 27          |
| Total HEX Value                                                                                                                 |                                                        |              | 1B          | 1B          | 1B          | 1B          | 1B          | 1B          | 1B          |
| OP7                                                                                                                             |                                                        |              |             |             |             |             |             |             |             |
| bit 7 (msb)                                                                                                                     | OP_TIME_WINT                                           |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 6                                                                                                                           | OP_DVB_USB = OP_MALAY                                  |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 5                                                                                                                           | OP_AMBLIGHT                                            |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 4                                                                                                                           | OP_COLUMBUS                                            |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 3                                                                                                                           | OP_DUMMYS                                              |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 2                                                                                                                           | OP_DUMMYS                                              |              | 0           | 0           | 0           | 0           | 0           | 0           | 0           |
| bit 1                                                                                                                           | OP_WEST_EU                                             |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| bit 0 (lsb)                                                                                                                     | OP_MULTI_STANDARD_EUR                                  |              | 1           | 1           | 1           | 1           | 1           | 1           | 1           |
| Total DEC Value                                                                                                                 |                                                        |              | 19          | 19          | 19          | 19          | 19          | 19          | 19          |
| Total HEX Value                                                                                                                 |                                                        |              | 03          | 03          | 03          | 03          | 03          | 03          | 03          |

## 9. Circuit Descriptions, Abbreviation List, and IC Data Sheets

**Index of this chapter:**

- 9.1 Introduction
- 9.2 Block Diagram
- 9.3 Input/Output
- 9.4 Tuner and IF
- 9.5 Video: TV Part (Diagrams B1, B2, and B3)
- 9.6 Columbus
- 9.7 Video: Scaler Part (Diagram B7, B8 and B9)
- 9.8 Audio Processing
- 9.9 Control
- 9.10 Abbreviation List
- 9.11 IC Data Sheets

Cristal Clear and Cristal Clear. The block diagram below (Figure 2.1) shows the Pixel Plus architecture; the architectures of the other models are shown in the block diagram on the next page (Figure 2.2).

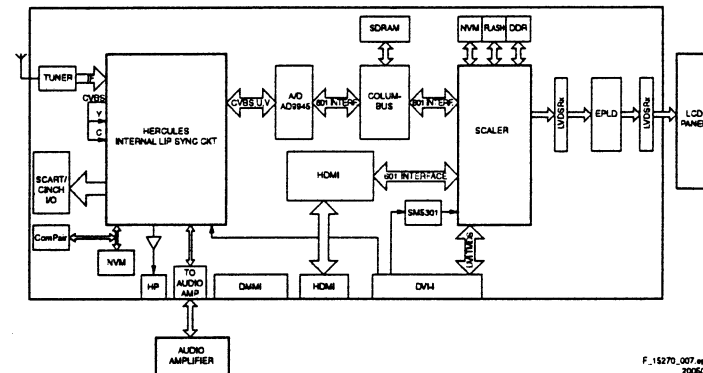
The architecture consists of a TV and Scaler panel, I/O panel, Side I/O and Local Keyboard panel and Power Supply panel. The functions for video/audio processing, microprocessor (P), and CC/Teletext (TXT) decoder are all combined in one IC (TDA150xx, item 7217), the so-called third generation Ultimate One Chip (UOC-III) or "Hercules". This chip has the following features:

- Control, small signal, mono/stereo, and extensive Audio/Video switching in one IC.
- Upgrade with digital sound & video processing.
- Alignment free IF, including SECAM-L/L1 and AM.
- FM sound 4.5/5.6/6/6.5, no traps/bandpass filters.
- Full multi-standard colour decoder.
- One Xtal reference for all functions (microprocessor, RCP, TXT/CC, RDS, colour decoder, and stereo sound processor).

## 9.1 Introduction

The LC4.3 LCD TV is a global LCD TV for the year 2005. It is the successor of the LC4.2 LCD TV and covers screens sizes 26 inch (in 15:9 and 16:9 ratio) and 32 inch (in 16:9 ratio) and has a new styling, called ME5. There are three different picture qualities available, depending on the model: Pixel Plus, Digital

## 9.2 Block Diagram



### Figure 9-1 Block Diagram

The PLL tuner UV1318 delivers the IF-signal, via audio & video SAW-filters, to the Video Signal Processor and FLASH embedded TEXT/Control/Graphics Micro Controller TDA120x1 (item 7011, also called Hercules). This IC has the following functions:

- Analogue Video Processing
- Sound Demodulation
- Audio Interfaces and switching
- Volume and tone control for loudspeakers
- Reflection and delay for loudspeaker channels
- Micro Controller
- Data Capture
- Display

The Hercules has one input for the internal CVBS signal and a video switch with 3 external CVBS inputs and a CVBS output. All CVBS inputs can be used as Y-input for Y/C signals. However, only 2 Y/C sources can be selected because the circuit has two chroma inputs. It is possible to add an additional CVBS(Y/C) input (CVBSYX and CX) when the YUV interface and the RGB/YPPRP input are not needed. Two SCART-connectors are used: SCART1 is for RGB-in, video in (CVBS)

and terrestrial out (CVBS), and SCART2 is meant for VCR (CVBS out and Y/C in). The CVBS-out on pin 19 of SCART2 can be used for monitoring purposes: WYSIWYR (What You See is What You Record).

Depending on the model of the TV set, the Hercules delivers its RGB signals either directly to theScaler IC or indirectly, via a Columbus chip (for 2D/3D comb filtering and spatial/temporal noise reduction, for its description: see further down in this text). The EP-LD, which is present in Pixel Plus models, provides additional sharpening to the picture. For a general outline, see the table and the block diagrams below, in which the architectures of the various models are given, together with their electronic building blocks.

Table 9-1 Models and picture quality

| Model       | Picture quality       |
|-------------|-----------------------|
| 32PF7320/10 | Pixel Plus            |
| 32PF5320/10 | Digital Crystal Clear |
| 26PF5320/10 | Digital Crystal Clear |
| 26PF4310/10 | Crystal Clear         |

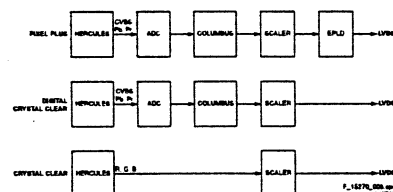


Figure 9-2 Block diagram of the internal building blocks

The Genesis GM1501 Malibu Scaler IC can receive two video input signals: SDTV (directly from Hercules or via Columbus), DVI (from an external DVI source), or PC (from external computer).

After the video processing, the digital data is sent via a Low Voltage Differential Signalling bus to the LCD panel. LVDS is used to improve data speed and to reduce EMI significantly. There are two I<sup>2</sup>C lines and two interrupt and communication lines (TV\_IRQ and TV\_SC\_COM) for the Scaler control. The Scaler communicates with the Hercules as a slave device. To avoid buffer overflow at the Scaler side, the TV\_SC\_COM line provides the necessary hardware flow control. To allow bi-directional communication, the Scaler can initiate a service interrupt-request to the Hercules via the TV\_IRQ line.

The Hercules, and EEPROM are supplied with 3.3 V, which is also present during STANDBY.

The EEPROM, or NVM (Non Volatile Memory) is used to store the settings.

The sound part is built up around the Hercules. The Source Selection, Decoding and Processing are all done by the Hercules.

Power supply input are several DC voltages coming from a supply panel.

### 9.3 Input/Output

The I/O is divided over two parts: Rear I/O and Side I/O. The rear has two SCART inputs, a PC/DVI-I input (VGA to DVI-I via an external adaptor) and an Audio input. The side has a CVBS and Y/C (SVHS) input, combined with L+R audio inputs, and has also a headphone output.

EXT1: The input of SCART1 is CVBS + RGB + L/R and the output is the video (+ sound) signal from the tuner (SC1\_CVBS\_RF\_OUT).

EXT2: The input of SCART2 is Y/C + CVBS + L/R. The output signal is CVBS\_SC2\_MON\_OUT (+ sound). SCART2 is meant for VCR and has therefore some additional signals in relation to EXT1 but no RGB: it has the possibility for Y/C\_in: Y\_in on pin 20 and Chroma\_in on pin 15. The selection of the external I/O's is controlled by the Hercules.

PC In (DVI-I, or VGA via external VGA to DVI-I adaptor): This input is directly going to the Scaler IC. See paragraph "Video: Scaler Part".

### 9.4 Tuner and IF

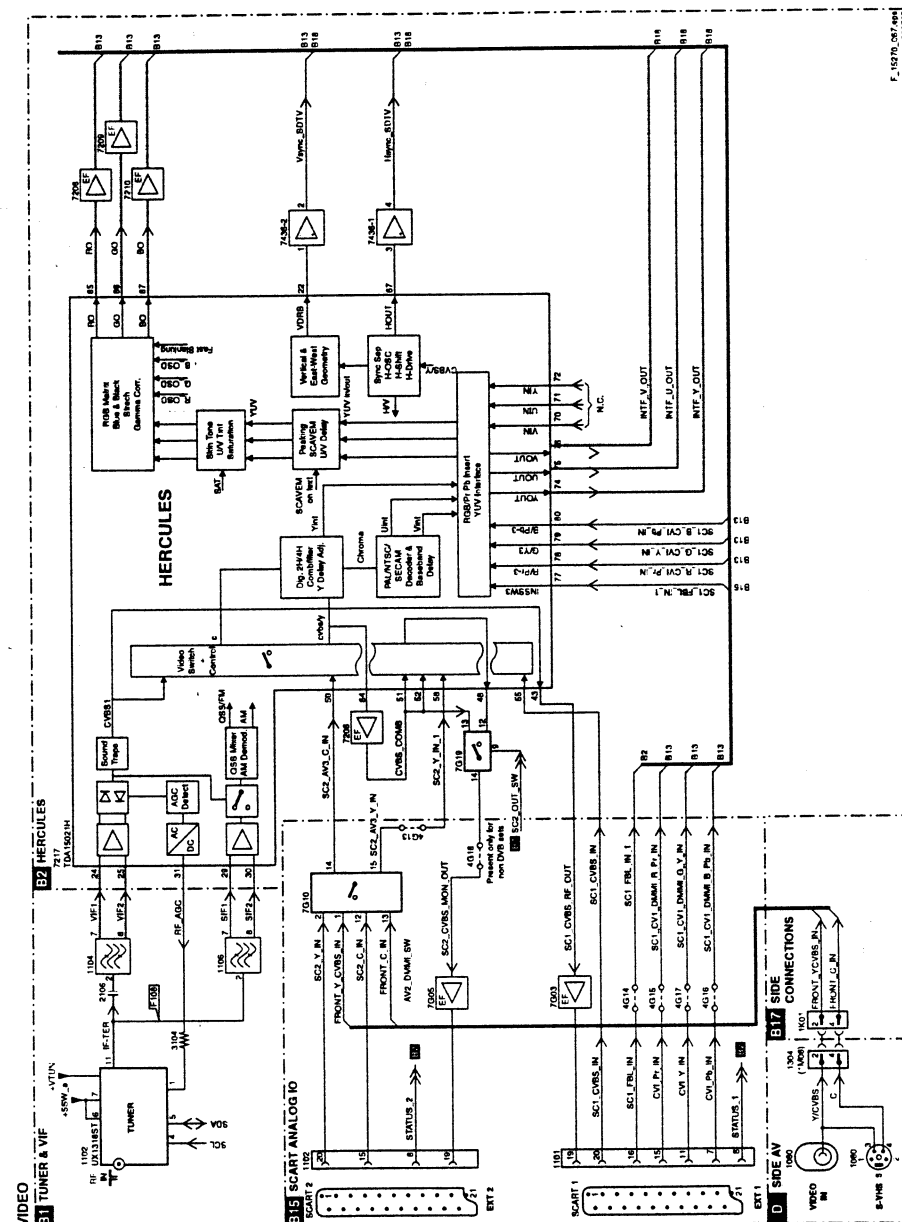
A Philips UV1318 Tuner is used in the TV board. The SIF signals are decoded by the Hercules. Tuning is done via I<sup>2</sup>C.

#### 9.4.1 Video IF Amplifier

The IF-filter is integrated in a SAW (Surface Acoustic Wave) filter. One for filtering IF-video (1104, in some models: 1105) and one for IF-audio (1106). The type of these filters depends on the standard(s) that has/have to be received.

The output of the tuner is controlled via an IF-amplifier with AGC-control. This is a voltage feedback from pin 31 of the Hercules to pin 1 of the tuner. The AGC-detector operates on top sync and top white level. AGC take-over point is adjusted via the service alignment mode 'Tuner' - 'AGC'. If there is too much noise in the picture, then it could be that the AGC setting is wrong. The AGC-setting could also be mis-aligned if the picture deforms with perfect signal; the IF-amplifier amplifies too much.

### 9.5 Video: TV Part (Diagrams B1, B2, and B3)





The video processing is completely handled by the Hercules

- IF demodulator.
- Chrominance decoder
- Sync separator.
- Horizontal & vertical drive.
- RGB processing.
- CVBS and SVHS source select.

It has also built-in features like:

- CTI.
- Black stretch.
- Blue stretch.
- White stretch.
- Slow start up.
- Dynamic skin tone correction etc.

Further, it also incorporates sound IF traps and filters, and requires only one crystal for all systems.

## 9.6 Columbus

### 9.6.1 Introduction

The Columbus is a combination of:

- A 2D/3D Comb filter for both PAL and NTSC, and
- A spatial/temporal noise reduction system for both colour and luminance signals.

The Columbus 3D Comb filter uses digitalised CVBS, U, and V (or C) signals and can be used with or without an external 16 Mbit SDRAM. Without external 16Mbit SDRAM, 3D comb filtering and temporal noise reduction are not possible.

The noise reduction part of the Columbus is controlled by the FBX software using the SNERT interface. The 2D/3D Comb filter part is controlled by the Main software using the I<sup>2</sup>C bus.

### 9.6.2 2D/3D Comb Filter

#### Introduction

The "3D Comb filter Columbus" is a combined 2D/3D Comb filter function that is part of the Columbus chip (circuit diagram B19, item 7M00). It is a comb filter for both PAL and NTSC.

The 3D Comb filter is used to separate chroma and luminance components out of a CVBS signal. It is of no use when the CVBS signal is a SECAM signal (SECAM signals cannot be combed). The Columbus chip can be used with or without 16 Mbit external SDRAM (circuit diagram B10, item 7B01). When an external SDRAM is connected to the IC, the Comb filter function can work in combined 2D/3D processing (depending on the detected pixel based motion). When no external SDRAM is connected, only 2D Comb filtering is possible.

The Columbus can comb the following standard signals:

- PAL B, PAL G, PAL H, PAL I, PAL D, PAL K: Colour standard PAL, Colour carrier at 4.43 MHz, field frequency: 50 Hz
- PAL M: Colour standard PAL, Colour carrier at 3.58 MHz, field frequency: 60 Hz
- PAL N: Colour standard PAL, Colour carrier at 3.58 MHz, field frequency: 50 Hz
- NTSC M: Colour standard NTSC, Colour carrier at 3.58 MHz, field frequency: 60 Hz

For NTSC signals, the PAL delay line must always be bypassed.

The following signals CANNOT be combed:

- Double Window signals or Multi PIP. For these signals, only one part or even no part of the signal is in relation with the burst. The part that is not in relation with the burst can become very blurred when combed by the Columbus

Comb filter. Such a signal must be bypassed. Notch mode is not even an option since e.g. in double window, one part can be a PAL signal while the other part is NTSC or SECAM.

- In cases where a SECAM signal is presented to the Columbus Comb filter; both the luminance and UV path must be bypassed. The PAL delay line inside the Columbus cannot be used for SECAM signals so it must also be bypassed. The luminance path must have luminance at its input instead of CVBS. A chroma delay line outside Columbus must be used for SECAM signals. Reason for this: the Columbus PAL delay line halves the output of the chroma signals in case of SECAM.
- Y/C, YPbPr, and RGB signals do not have to be combed. So both the luminance and UV path must be bypassed. The PAL delay line will also be bypassed.
- In cases where the Columbus Comb filter does not receive a CVBS signal with burst at the right place according to the standard (this includes black and white signals without burst), phase correction results become unpredictable and the Comb filter must be set in bypass (= luminance path bypassed, UV path bypassed, PAL delay line bypassed)
- VCR signals cannot be combed and must be processed in notch mode, or bypassed.

#### Columbus Modes

The several modes of the Columbus 3D Comb filter are:

- Bypass mode.
- Band-Pass-Notch mode.
- 2D Comb filter modes.
  - Simple median.
  - Median.
- Field Comb filter mode.
- Frame Comb filter mode.

#### Bypass Mode

The 3D Comb filter can be set in bypass mode. In this mode, the CVBS, U and V signals are just bypassed to the output.

#### Band-Pass-Notch Mode

This is a mode where no Comb filtering is applied. A "Band Pass Filter" is used to filter the chroma information out of the CVBS signal. A "Notch Filter" is used to subtract the sub carrier out of the CVBS in order to make a luminance signal without chroma sub carrier.

In terms of cross colour and cross luminance, this mode has the worst performance of all. It is only used on these signals where no comb filtering can be applied (non-standard signals and most VCR signals for example).

#### 2D Comb Filter Modes

A Comb filter does an action on a current pixel and a delayed pixel. When the delayed pixel is a line-delayed pixel, we talk about a "Spatial or 2D Comb Filter" (for NTSC the delay must be 1 line, for PAL it must be 2 lines).

Spatial or 2D Comb filters show problems on vertical colour transients and on single coloured lines. For these situations, extra hardware is added in the Columbus chip to avoid these kinds of problems. However even with these extra measures, there are still situations where the 2D Comb filter does not perform optimally (diagonal resolution and single lines with equal luminance content). In order to restrict the working area of the 2D Comb filter to the frequencies where the sub carrier is present, a horizontal band pass filter always precedes a 2D Comb filter.

When a 2D Comb filter has no extra hardware to avoid problems at vertical colour transients (or this extra hardware is switched "off"), the Comb filter is called a "simple median filter". When there is extra hardware to avoid these kinds of problems, the filter is called a "median filter".

#### Field Comb Filter Mode

A Comb filter does an action on a current pixel and a delayed pixel. When the delayed pixel is a field-delayed pixel, we talk

about a "Field Comb Filter". Field Comb filters are only for PAL of commercial interest.

Field Comb filters show also problems on vertical colour transients and on motion. For the vertical transients, a hanging dots detector has been added, however the performance on vertical transients of the field Comb filter, even with this hanging dots detector, is worse than the performance of the 2D Comb filter. On motion, the field Comb filter performs very badly. A motion detector must detect the pixels where there is motion and on these pixels, the Comb filter must be forced back to 2D Comb filter mode. This switching back is not implemented with a hard switch, but with a motion controlled fader. When there is a lot of motion, the fader will take a lot of the 2D Comb filter output, when there is less motion, more field-combed signal will be taken.

A field Comb filter is also called a "vertical-temporal filter" because it filters in the vertical and temporal direction.

#### Frame Comb Filter Mode

A Comb filter does an action on a current pixel and a delayed pixel. When the delay is a frame, we talk about a "Frame Comb Filter". For NTSC we need a delay of one frame, for PAL however the delay must be two frames.

Frame Comb filters have the best performance, but just like the Field Comb filter, they perform very badly on motion. A motion detector will have to detect motion and on these motion pixels, 2D Comb filtering will have to be applied. A frame Comb filter is a pure "temporal filter".

The Columbus needs an external memory connected to it, before it can do a temporal or vertical-temporal Comb filter action. When no external memory is connected, field or frame Comb filtering is impossible.

#### Block Diagram

In the next block diagram, two main parts of the Columbus 2D/3D Comb filter can be seen:

- The upper part is what is called the luminance Comb filter. It tries to make an as clean as possible luminance signal out of the CVBS signal at the input.
- The lower part receives U and V signals (sequentially) that are normally only band pass filtered in front of the 3D Comb filter. It filters all left over luminance signals out of it, in order to make an as clean as possible U and V signal.

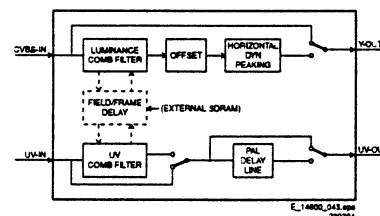


Figure 9-4 Columbus 2D/3D Comb Filter block diagram

The Comb filter has two inputs. One is the CVBS where clean luminance (Y) will be extracted from; the other one is UV where a clean U and V signal will be extracted. Both input signals are digital signals.

The field or frame delay is used for the Field and Frame Comb filter mode. An external memory connected to the Columbus IC provides this delay.

Phase correction is done at the inputs of both the Comb filter blocks. There is a phase correction for spatial filtering (called the spatial phase corrector) and a separate phase correction on the signals used for temporal (Frame or Field) Comb filtering (called the temporal phase corrector).

The offset block receives the motion dependant 2D/3D Comb filtered signal as input. The black level of the luminance signal is restored and the result is output. The black level restoration is corrected continuously. However, on VCR signals, this restoration can become unstable. Therefore, on VCR signals, a fixed black level restoration value must be forced.

A horizontal dynamic peaking can be done on the luminance signal. This peaking is adaptive in order not to amplify any cross luminance distortion. It detects where there could be left over sub carrier in the luminance signal and reduces the peaking over there. The detection of the left over cross luminance is different depending on the pre-filter or post-filter mode.

The amount of peaking and coring can be chosen. The peaking algorithm behind it is a simplified copy of the luminance peaking of picnic. After the peaking block, the signal is output as clean luminance.

The bypass switches have the obvious purpose of bypassing the input signal, in case no Comb filtering is wanted.

A PAL delay line is added in the UV path. This is done because a delay line in front of the 3D Comb filter does need an extra vertical filter action on the UV signals. This vertical filtering deteriorates the vertical transient performance for colours. The Columbus Comb filter cannot undo this. However, this reduction in performance can be omitted by putting the PAL delay line after the 3D Comb filter block.

For PAL signals, the PAL delay line in front of the Columbus 3D Comb filter is bypassed and the Columbus delay line is switched "on". In cases where the delay line in front of Columbus cannot be bypassed, the Columbus PAL delay line is bypassed.

For NTSC signals, the PAL delay line is bypassed as usual.

## 9.6.3 Noise Reduction and Noise Estimator

The noise reduction function is a sophisticated successor of the noise reduction module from the PICNIC-chip, also known as "LIMERIC".

Besides the noise reduction part, the Columbus noise reduction module also comprises a noise estimator. This noise estimator (the LORE-noise estimator) is a new design with the ambition of more accuracy and with less control complexity than the existing noise estimators.

## 9.7 Video: Scaler Part (Diagram B7, B8 and B9)

The Genesis gm1501 Scaler is a dual channel graphics and video processing IC for LCD monitors and televisions incorporating Picture in Picture, up to SXGA output resolutions. The Scaler controls the display processing in an LCD TV, e.g. like the deflection circuit in a CRT-based TV. It controls all the view modes (e.g. like "zooming" and "shifting"). Features like PC (VGA) or HD inputs, are also handled by this part.

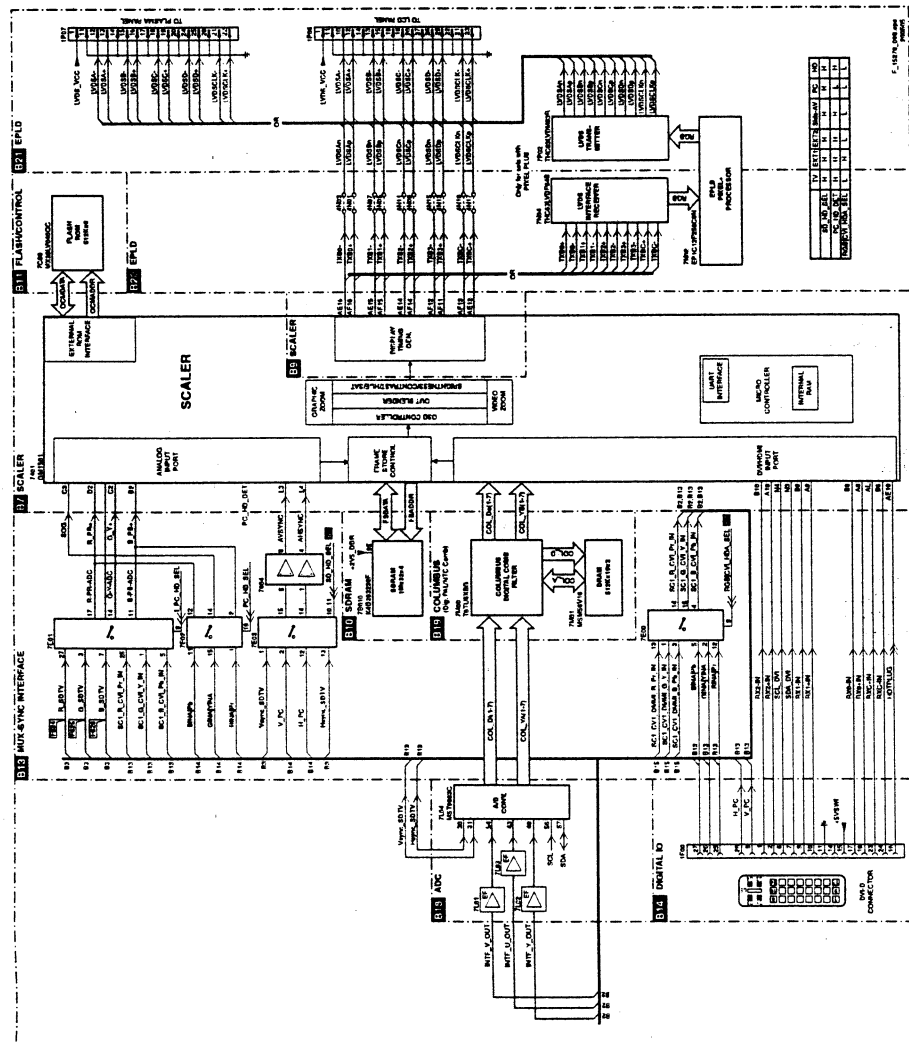


Figure 9-5 Block diagram scaler part

## 9.7.1 Teletext Path

In Pixel Plus and Digital Crystal Clear models, which have an ADC (B18) and Columbus 3D combfilter (B19), the digital input of the scaler is used for the digital video signal (Columbus output), whereas the analogue RGB input of the scaler is used for teletext. This means that no mixed mode (video plus teletext simultaneously) is possible. In Crystal Clear models, which do not have an ADC and Columbus, the analogue RGB input of the scaler is used for both video and teletext (generated by the Hercules). The digital input of the Scaler is not used in Crystal Clear TV sets. See also the block diagrams at the beginning of this chapter. When faultfinding, checking the teletext path may be useful: If there is sound and teletext, but no video and user menu (blank screen), the digital path (Hercules - ADC - Columbus - Scaler) is faulty. If there is sound but no teletext, the back-end part (Scaler - LCD panel) is faulty.

## 9.7.2 Features

The Scaler provides several key IC functions:

- Scaling.
- Auto-configuration/ Auto-Detection.
- Various Input Ports:
  - Analog RGB.
  - Video Graphics.
- Integrated LVDS Transmitter.
- On-chip Micro-controller

## 9.7.3 Inputs

**Analog RGB**

The RGB input is fed to pins B2, C2 and D2 of the Scaler IC (Genesis GM1501, Item 7801, see circuit diagram B8). This input consists of either the Hercules RGB output or the RGB/YpbPr input of the VGA connector. The Scaler can switch between the two signals via the PC\_HD\_SEL signal and selection IC SM5301 (see circuit diagram B13).

**PC (VGA) Input**

The VGA input is processed by the VGA block of the Scaler. The Scaler supports pixel frequencies up to 165MHz. YpbPr format is also supported via the VGA interface and covers a resolution of 480p/560p/720p/1080i.

## 9.7.4 Output

The Display Output Port provides data and control signals that permit the Scaler to connect to a variety of display devices using a TTL or LVDS interface. The output interface is configurable for single or dual wide TTL/LVDS in 18, 24 or 30-bit RGB pixels format. All display data and timing signals are synchronous with the DCLK output clock. The integrated LVDS transmitter is programmable to allow the data and control signals to be mapped into any sequence depending on the specified receiver format.

## 9.8 Audio Processing

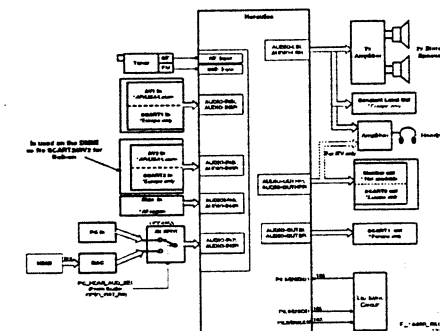


Figure 9-6 Block diagram audio processing

The audio decoding is done entirely via the Hercules. The IF output from the Tuner is fed directly to either the Video-IF or the Sound-IF input depending on the type of concept chosen. There are mainly two types of decoder in the Hercules, an analogue decoder that decodes only Mono, regardless of any standards, and a digital decoder (or DEMDEC) that can decode both Mono as well as Stereo, again regardless of any standards.

In this chassis, the analogue decoder is used in two cases:

- It is used for AM Sound demodulation in the Europe SECAM LL' transmission.
- It is used for all FM demodulation in AV-Stereo sets.

## 9.8.1 Diversity

The diversity for the Audio decoding can be broken up into two main concepts:

- The Quasi Split Sound concept used in Europe and some AP sets.
- The Inter Carrier concept, used in NAFTA and LATAM. The UOC-III family makes no difference anymore between QSS- and Inter-carrier IF, nearly all types are software-switchable between the two SAW-filter constructions.

Simple data settings are required for the set to determine whether it is using the Inter Carrier or the QSS concept. These settings are done via the "QSS" and "FMI" bit found in SAM mode. Due to the diversity involved, the data for the 2 bits are placed in the NVM location and it is required to write once during startup.

On top of that, it can be further broken down into various systems depending on the region. The systems or region chosen, will in turn affect the type of sound standard that is/are allowed to be decoded.

- For the case of Europe, the standard consists of BG/DK/LL' for a Multi-System set. There are also versions of Eastern Europe and Western Europe set and the standard for decoding will be BG/DK and I/DK respectively. FM Radio is a feature diversity for the Europe sets. The same version can have either FM Radio or not, independent of the system (e.g. sets with BG/DK/LL' can have or not have FM radio).
- For the case of NAFTA and LATAM, there is only one transmission standard, which is the M standard. The diversity then will be based on whether it has a dBx noise reduction or a Non-dBx (no dBx noise reduction).
- For the case of AP, the standard consists of BG/DK/MM for a Multi-System set. The diversity here will then depend on

the region. AP China can have a Multi-System and I/DK version. For India, it might only be BG standard.

### 9.8.2 Functionality

The features available in the Hercules are as follows:

- Treble and Bass Control.
- Surround Sound Effect that includes:
  - Incredible Stereo.
  - Incredible Mono.
  - 3D Sound (not for AV Stereo).
  - TruSurround (not for AV Stereo).
  - Virtual Dolby Surround, VDS422 (not for AV Stereo).
  - Virtual Dolby Surround, VDS423 (not for AV Stereo).
  - Dolby Pro-Logic (not for AV Stereo).
- Bass Feature that includes:
  - Dynamic Ultra-Bass.
  - Dynamic Bass Enhancement.
  - BBE (not for AV Stereo).
- Auto-Volume Leveler.
- 5 Band Equalizer.
- Loudness Control.

All the features stated are available for the Full Stereo versions and limited features for the AV Stereo

### 9.8.3 Audio Amplifier

The audio amplifier part is very straightforward. It uses two integrated TDA8931T power amplifiers for the L and R channels; each amplifier IC is able to deliver a maximum output of 20 W<sub>RMS</sub> continuously in a 4-6 ohm speaker without needing a heatsink.

The operating supply for the amplifier may range from 12 V to 32 V; in the LC04x TV set, depending on the model, supply voltages of 18 V (for the 5 W / 8 ohm version) or 24 V (for the 15 W / 4 ohm version) are used.

Muting is done via the SOUND\_ENABLE line connected to pins 7 of both amplifier-ICs, which comes from the Hercules.

### 9.8.4 Audio: Lip Sync

No Lip Sync adjustments are necessary in this model.

## 9.9 Control

### 9.9.1 Hercules

The System Board has two main micro-controllers on board. These are:

- On-chip x86 micro-controller (OCM) from Genesis LCD TV/Monitor Controller.
- On-chip 80C51 micro-controller from Philips Semiconductor UOCIII (Hercules) series.

Each micro-controller has its own I<sup>2</sup>C bus which hosts its own internal devices.

The Hercules is integrated with the Video and Audio Processor. For dynamic data storage, such as SMART PICTURE and SMART SOUND settings, an external NVM IC is being used. Another feature includes an optional Teletext/Closed Caption decoder with the possibility of different page storage depending on the Hercules type number.

### 9.9.2 Block Diagram

The block diagram of the Micro Controller application is shown below.

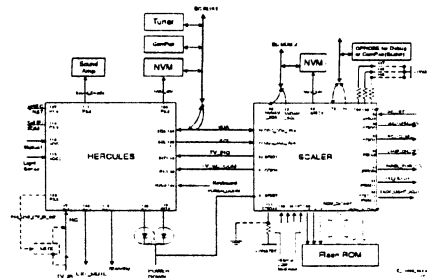


Figure 9-7 Micro Controller block diagram

### 9.9.3 Basic Specification

The Micro Controller operates at the following supply voltages:

- +3.3 V<sub>DC</sub> at pins 4, 88, 94, and 109.
- +1.8 V<sub>DC</sub> at pins 93, 96, and 117.
- I<sup>2</sup>C pull up supply: +3.3V<sub>DC</sub>.

### 9.9.4 Pin Configuration and Functionality

The ports of the Micro Controller can be configured as follows:

- A normal input port.
- An input ADC port.
- An output Open Drain port.
- An output Push-Pull port.
- An output PWM port.
- Input/Output Port

The following table shows the ports used for the LC04 control:

Table 9-2 Micro Controller ports overview

| Pin | Name         | Description        | Configuration |
|-----|--------------|--------------------|---------------|
| 97  | INT0/P0.5    | IR                 | INT0          |
| 98  | P1.0/INT1    | TV_IRQ             | INT2          |
| 99  | P1.1/T0      | TV_SC_COM          | P1.1          |
| 102 | P0.4/I2SWS   | EXT_MUTE           | P0.4          |
| 103 | P0.3/I2SCLK  | Lip Sync           | I2SCLK        |
| 104 | P0.2/I2SDO2  | NVM_WP             | P0.2          |
| 105 | P0.1/I2SDO1  | Lip Sync           | I2SDO1        |
| 106 | P0.0/I2SDI/O | Lip Sync           | I2SDI/O       |
| 107 | P1.3/T1      | PC-TV_LED          | P1.3          |
| 108 | P1.6/SCL     | SCL                | SCL           |
| 109 | P1.7/SDA     | SDA                | SDA           |
| 111 | P2.0/TPWM    | SOUND_ENABLE       | P2.0          |
| 112 | P2.1/PWM0    | (for future use)   | -             |
| 113 | P2.2/PWM1    | (for future use)   | -             |
| 114 | P2.3/PWM2    | SEL_IF             | P2.3          |
| 115 | P3.0/ADC0    | Light Sensor - SDM | ADC0          |
| 116 | P3.1/ADC1    | STATUS_1           | ADC1          |
| 119 | P3.2/ADC2    | STATUS_2           | ADC2          |
| 120 | P3.3/ADC3    | KEYBOARD           | ADC3          |
| 122 | P2.4/PWM3    | STANDBY            | P2.4          |
| 123 | P2.5/PWM4    | (for future use)   | -             |
| 126 | P1.2/INT2    | (for future use)   | -             |
| 127 | P1.4/RX      | HERC_RESET         | -             |
| 128 | P1.5/TX      | POWER_DOWN         | P1.5          |

The description of each functional pin is explained below:

- **LED.** This signal is used as an indication for the Standby, Remote and Error Indicator. Region diversity:
  - During protection mode, the LED blinks and the set is in standby mode.
  - During error conditions it blinks at a predefined rate.
  - After receiving a valid RC-5 or local keyboard command it flashes once.
  - For sets with error message indication, the LED blinks when message is active and the set is in standby mode.
- **SCL.** This is the clock wire of the two-wire single master bi-directional I<sup>2</sup>C bus.
- **SDA.** This is the data wire of the two-wire single master bi-directional I<sup>2</sup>C bus.
- **STANDBY.** The Hercules generates this signal. This can enable the power supply in normal operation and disable it during Standby. It is of logic "high" (3.3 V) under normal operation and "low" (0 V) during Standby.
- **IR.** This input pin is connected to an RC5 remote control receiver.
- **SEL-IF.** This is an output pin to switch the Video SAW filter between M system and other systems.
  - 0: NTSC M (default)
  - 1: PAL B/G, DK, I, L
- **NVM\_WP.** The global protection line is used to enable and disable write protection to the NVM. When write to the NVM is required, pin 7 of the NVM must be pulled to logic '0' first (via Write\_Protect of the micro-controller pin) before a write is performed. Otherwise pin 7 of NVM must always be at logic "1"
  - 0: Disabled
  - 1: Enabled (default)
- **SOUND\_ENABLE.** This pin is used to MUTE the audio amplifier. It is configured as push pull.
- **STATUS\_1.** This signal is used to read the status of the SCART 1 input.
- **STATUS\_2.** This signal is used to read the status of the SCART 2 input.
- **HERC\_RESET.** This pin is used to switch the +1.8V supply.
- **POWER\_DOWN.** The power supply generates this signal. Logic "high" (3.3 V) under normal operation of the TV and goes "low" (0 V) when the Mains input voltage supply goes below 70 V<sub>AC</sub>.
- **KEYBOARD.** Following are the Keyboard functions and the step values (8 bit) for it.

Table 9-3 Local keyboard values

| Function                    | Voltage (V <sub>DC</sub> ) | Step values (8 bit) |
|-----------------------------|----------------------------|---------------------|
| NAFTA Standby               | 0                          | 0 - 6               |
| Ch +                        | 0.43                       | 7 - 33              |
| Exit Factory (Ch- and Vol-) | 0.69                       | 34 - 53             |
| Ch -                        | 0.93                       | 54 - 73             |
| Menu (Vol- and Vol +)       | 1.19                       | 74 - 96             |
| Vol -                       | 1.49                       | 97 - 121            |
| DVD Eject                   | 1.8                        | 122 - 147           |
| Vol +                       | 2.12                       | 148 - 169           |

- **TV\_IRQ.** This signal is the interrupt from the Scaler IC.
- **TV\_SC\_COM.** This signal is used for the communication with the Scaler IC.
- **EXT\_MUTE.** This signal is used to reduce the Switch-off plop.

## 9.10 Abbreviation List

|              |                                                                                                                                           |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 0/6/12       | SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16:9 format, 12 = play 4:3 format                        |
| 1080i        | 1080 visible lines, interlaced                                                                                                            |
| 1080p        | 1080 visible lines, progressive scan                                                                                                      |
| 2CS          | 2 Carrier Sound (or 2 Channel Stereo)                                                                                                     |
| 480i         | 480 visible lines, interlaced                                                                                                             |
| 480p         | 480 visible lines, progressive scan                                                                                                       |
| ACI          | Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page       |
| ADC          | Analogue to Digital Converter                                                                                                             |
| AFC          | Automatic Frequency Control; Control signal used to tune and lock to the correct frequency                                                |
| AGC          | Automatic gain control (feedback) signal to the tuner. This circuit ensures a constant output amplitude regardless of the input amplitude |
| AM           | Amplitude Modulation; A "data encoding to a carrier" method, such that the carrier amplitude is proportional to the data value            |
| AP or A/P    | Asia Pacific                                                                                                                              |
| AR           | Aspect Ratio: 4 by 3 or 16 by 9                                                                                                           |
| ASD          | Automatic Standard Detection                                                                                                              |
| AV           | External Audio Video                                                                                                                      |
| B-SC1-IN     | Blue SCART1/EXT1 in                                                                                                                       |
| B-SC2-IN     | Blue SCART2/EXT2 in                                                                                                                       |
| B-TXT        | Blue Teletext                                                                                                                             |
| B/G          | Monochrome TV system. Sound carrier distance is 5.5 MHz. B= VHF-band, G= UHF-band                                                         |
| BOCMA        | Bimos one Chip Mid-end Architecture: video and chroma decoder                                                                             |
| C-FRONT      | Chrominance front input                                                                                                                   |
| CBA          | Circuit Board Assembly (also called PCB or PWB)                                                                                           |
| CL           | Constant Level: audio output to connect with an external amplifier                                                                        |
| CLUT         | Colour Look-Up Table                                                                                                                      |
| COLUMBUS     | COLOUR LUMInance Baseband Universal Subsystem. IC performing noise reduction and 2D/3D comb filtering                                     |
| ComPair      | Computer aided rePair. A tool for diagnosing a TV through a PC controlled interface                                                       |
| CSM          | Customer Service Mode                                                                                                                     |
| CVBS         | Composite Video and Blanking Signal; A single video signal that contains luminance, colour, and timing information                        |
| CVBS-EXT     | CVBS signal from external source (VCR, VCD, etc.)                                                                                         |
| CVBS-INT     | CVBS signal from internal Tuner                                                                                                           |
| CVBS-MON     | CVBS monitor signal                                                                                                                       |
| CVBS-TER-OUT | CVBS TERrestrial OUTput signal                                                                                                            |
| DAC          | Digital to Analogue Converter                                                                                                             |
| DBE          | Dynamic Bass Enhancement: extra low frequency amplification                                                                               |
| DFU          | Directions For Use: Owner's manual                                                                                                        |
| DNR          | Dynamic Noise Reduction / Digital Noise Reduction; Noise reduction feature of the set                                                     |
| DRAM         | Dynamic RAM; dynamically refreshed RAM                                                                                                    |
| DSP          | Digital Signal Processing                                                                                                                 |
| DST          | Dealer Service Tool; Special remote control designed for dealers to enter                                                                 |

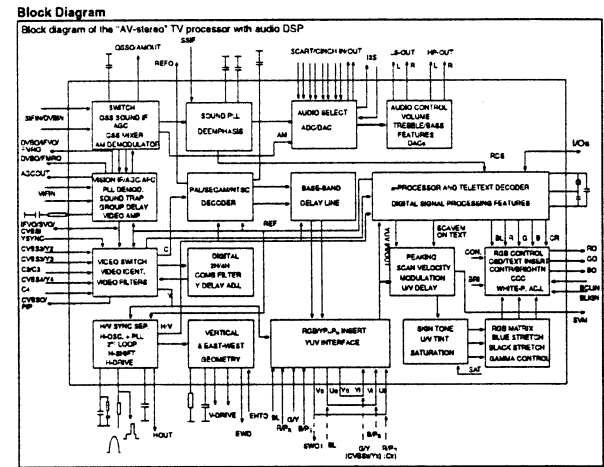
|                  |                                                                                                                                                                                                                   |                  |                                                                                                                                                                                                                    |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                  | e.g. service mode (a DST-emulator is available in ComPair)                                                                                                                                                        | LL'              | Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I                                                                                                            |
| DTS              | Digital Theatre System; A multi-channel surround sound format, similar to Dolby Digital                                                                                                                           | LS               | LoudSpeaker                                                                                                                                                                                                        |
| DVD              | Digital Versatile Disc                                                                                                                                                                                            | LVDS             | Low Voltage Differential Signalling, data transmission system for high speed and low EMI communication.                                                                                                            |
| EEPROM           | Electrically Erasable and Programmable Read Only Memory                                                                                                                                                           | M/N              | Monochrome TV system. Sound carrier distance is 4.5 MHz. M= 525 lines @ 60 Hz, N= 625 lines @ 50 Hz                                                                                                                |
| EPG              | Electronic Program Guide: system used by broadcasters to transmit TV guide information (= NexTVView)                                                                                                              | MOSFET           | Metal Oxide Semiconductor Field Effect Transistor                                                                                                                                                                  |
| EU               | Europe                                                                                                                                                                                                            | MPEG             | Motion Pictures Experts Group. An ISO/IEC body that has given its name to an image compressing scheme for moving video                                                                                             |
| EXT              | EXTErnal (source), entering the set by SCART or by cinches (jacks)                                                                                                                                                | MSP              | Multi-standard Sound Processor: ITT sound decoder                                                                                                                                                                  |
| FBL              | Fast Blanking; DC signal accompanying RGB signals. To blank the video signal when it is returning from the right side of the screen to the left side. The video level is brought down below the black video level | MUTE             | MUTE Line                                                                                                                                                                                                          |
| FBL-SC1-IN       | Fast blanking signal for SCART1 in                                                                                                                                                                                | NC               | Not Connected                                                                                                                                                                                                      |
| FBL-SC2-IN       | Fast blanking signal for SCART2 in                                                                                                                                                                                | NICAM            | Near Instantaneously Companded Audio Multiplexing; This is a digital sound system, mainly used in Europe                                                                                                           |
| FBL-TXT          | Fast Blanking Teletext                                                                                                                                                                                            | NTSC             | National Television Standard Committee. Colour system used mainly in North America and Japan. Colour carrier NTSC M/N = 3.579545 MHz, NTSC 4.43 = 4.433619 MHz (this is a VCR norm, it is not transmitted off-air) |
| FM               | Field Memory; A memory chip that is capable of storing one or more TV picture fields / Frequency Modulation; A technique that sends data as frequency variations of a carrier signal                              | NVM              | Non Volatile Memory: IC containing data such as alignment values, preset stations                                                                                                                                  |
| FMR              | Radio receiver that can receive the FM Band 87.5 - 108 MHz                                                                                                                                                        | O/C              | Open Circuit                                                                                                                                                                                                       |
| FRC              | Frame Rate Converter                                                                                                                                                                                              | ON/OFF LED       | On/Off control signal for the LED                                                                                                                                                                                  |
| FRONT-C          | Front input chrominance (SVHS)                                                                                                                                                                                    | OSD              | On Screen Display                                                                                                                                                                                                  |
| FRONT-DETECT     | Control line for detection of headphone insertion, Service Mode jumper, power failure detection                                                                                                                   | PAL              | Phase Alternating Line. Colour system used mainly in Western Europe (colour carrier = 4.433619 MHz) and South America (colour carrier PAL M = 3.575612 MHz and PAL N = 3.582056 MHz)                               |
| FRONT-Y_CVBS     | Front input luminance or CVBS (SVHS)                                                                                                                                                                              | PC               | Personal Computer                                                                                                                                                                                                  |
| G-SC1-IN         | Green SCART1/EXT1 in                                                                                                                                                                                              | PCB              | Printed Circuit Board (or PWB)                                                                                                                                                                                     |
| G-SC2-IN         | Green SCART2/EXT2 in                                                                                                                                                                                              | PIG              | Picture In Graphic                                                                                                                                                                                                 |
| G-TXT            | Green teletext                                                                                                                                                                                                    | PIP              | Picture In Picture                                                                                                                                                                                                 |
| H                | H_sync to the module                                                                                                                                                                                              | PLL              | Phase Locked Loop. Used, for example, in FST tuning systems. The customer can directly provide the desired frequency                                                                                               |
| HA               | Horizontal Acquisition; horizontal sync pulse                                                                                                                                                                     | Progressive Scan | Scan mode where all scan lines are displayed in one frame at the same time, creating a double vertical resolution.                                                                                                 |
| HD               | High Definition                                                                                                                                                                                                   | PWB              | Printed Wiring Board (also called PCB or CBA)                                                                                                                                                                      |
| HP               | HeadPhone                                                                                                                                                                                                         | RAM              | Random Access Memory                                                                                                                                                                                               |
| I                | Monochrome TV system. Sound carrier distance is 6.0 MHz. VHF- and UHF-band                                                                                                                                        | RC               | Remote Control transmitter                                                                                                                                                                                         |
| I <sup>2</sup> C | Integrated IC bus                                                                                                                                                                                                 | RC5 or 6         | Remote Control system 5 or 6, the signal from the remote control receiver                                                                                                                                          |
| I <sup>2</sup> S | Integrated IC Sound bus                                                                                                                                                                                           | RGB              | Red, Green, and Blue colour space; The primary colour signals for TV. By mixing levels of R, G, and B, all colours (Y/C) are reproduced                                                                            |
| IC               | Integrated Circuit                                                                                                                                                                                                | RGBHV            | Red, Green, Blue, Horizontal sync, and Vertical sync                                                                                                                                                               |
| IF               | Intermediate Frequency                                                                                                                                                                                            | ROM              | Read Only Memory                                                                                                                                                                                                   |
| Interlaced       | Scan mode where two fields are used to form one frame. Each field contains half the number of the total amount of lines. The fields are written in "pairs", causing line flicker.                                 | SAM              | Service Alignment Mode                                                                                                                                                                                             |
| IR               | Infra Red                                                                                                                                                                                                         | SC               | SandCastle: two-level pulse derived from sync signals                                                                                                                                                              |
| IRQ              | Interrupt ReQuest                                                                                                                                                                                                 | SCART IN         | SCART in                                                                                                                                                                                                           |
| Last Status      | The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences                                 | SCART OUT        | SCART out                                                                                                                                                                                                          |
| LATAM            | LATIn AMerica                                                                                                                                                                                                     | S/C              | Short Circuit                                                                                                                                                                                                      |
| LC04             | Philips chassis name for LCD TV 2004 project                                                                                                                                                                      | SCART            | Syndicat des Constructeurs d'Appareils Radiorécepteurs et                                                                                                                                                          |
| LCD              | Liquid Crystal Display                                                                                                                                                                                            |                  |                                                                                                                                                                                                                    |
| LED              | Light Emitting Diode; A semiconductor diode that emits light when a current is passed through it                                                                                                                  |                  |                                                                                                                                                                                                                    |
| LINE-DRIVE       | Horizontal (line) deflection drive signal (for the Line transistor)                                                                                                                                               |                  |                                                                                                                                                                                                                    |

|              |                                                                                                                                                                                                                                     |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SCL          | Serial Clock Signal on I <sup>2</sup> C bus                                                                                                                                                                                         |
| SD           | Standard Definition                                                                                                                                                                                                                 |
| SDA          | Serial Data Signal on I <sup>2</sup> C bus                                                                                                                                                                                          |
| SDRAM        | Synchronous DRAM                                                                                                                                                                                                                    |
| SECAM        | SÉquence Couleur Avec Mémoire; Colour system mainly used in France and East Europe. The chroma is FM modulated and the R-Y and B-Y signals are transmitted line sequentially. Colour carriers= 4.406250 MHz and 4.250000 MHz        |
| SIF          | Sound Intermediate Frequency                                                                                                                                                                                                        |
| SMPS         | Switched Mode Power Supply                                                                                                                                                                                                          |
| SND          | SouND                                                                                                                                                                                                                               |
| SNDL-SC1-IN  | Sound left SCART1 in                                                                                                                                                                                                                |
| SNDL-SC1-OUT | Sound left SCART1 out                                                                                                                                                                                                               |
| SNDL-SC2-IN  | Sound left SCART2 in                                                                                                                                                                                                                |
| SNDL-SC2-OUT | Sound left SCART2 out                                                                                                                                                                                                               |
| SNDR-SC1-IN  | Sound right SCART1 in                                                                                                                                                                                                               |
| SNDR-SC1-OUT | Sound right SCART1 out                                                                                                                                                                                                              |
| SNDR-SC2-IN  | Sound right SCART2 in                                                                                                                                                                                                               |
| SNDR-SC2-OUT | Sound right SCART2 out                                                                                                                                                                                                              |
| SOPS         | Self Oscillating Power Supply                                                                                                                                                                                                       |
| S/PDIF       | Sony Philips Digital InterFace; This is a consumer interface used to transfer digital audio                                                                                                                                         |
| SRAM         | Static RAM                                                                                                                                                                                                                          |
| STBY         | STandBY                                                                                                                                                                                                                             |
| SVHS         | Super Video Home System                                                                                                                                                                                                             |
| SW           | Software or Subwoofer or Switch                                                                                                                                                                                                     |
| THD          | Total Harmonic Distortion                                                                                                                                                                                                           |
| TXT          | Teletext; TXT is a digital addition to analogue TV signals that contain textual and graphical information (25 rows x 40 columns). The information is transmitted within the first 25 lines during the Vertical Blank Interval (VBI) |
| uP           | Microprocessor                                                                                                                                                                                                                      |
| VA           | Vertical Acquisition                                                                                                                                                                                                                |
| VL           | Variable Level out: processed audio output towards external amplifier                                                                                                                                                               |
| VCR          | Video Cassette Recorder                                                                                                                                                                                                             |
| VGA          | Video Graphics Array; 640x480 (4:3)                                                                                                                                                                                                 |
| WD           | Watch Dog                                                                                                                                                                                                                           |
| WYSIWYR      | What You See Is What You Record: record selection that follows main picture and sound                                                                                                                                               |
| XTAL         | Quartz crystal                                                                                                                                                                                                                      |
| Y            | Luminance signal                                                                                                                                                                                                                    |
| Y/C          | Y consists of luminance signal, blanking level and sync; C consists of chroma (colour) signal                                                                                                                                       |
| YPbPr        | This is a scaled version of the YUV colour space; Y= Luminance, Pb/Pr= Colour difference signals B-Y and R-Y, other amplitudes w.r.t. to YUV                                                                                        |
| YUV          | Colour space used by the NTSC and PAL video systems. Y is the luminance and U/V are the colour difference signals                                                                                                                   |

9.11 IC Data Sheets

This section shows the internal block diagrams and pin layouts of ICs that are drawn as "black boxes" in the electrical diagrams (with the exception of "memory" and "logic" ICs).

9.11.1 Diagram B2, Type TDA15021H (IC7217, Hercules)



Pin Configuration

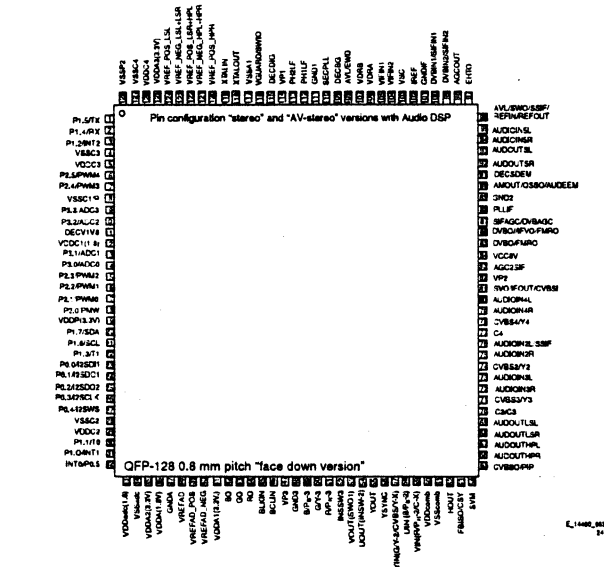


Figure 9-8 Internal block diagram and pin configuration

9.11.2 Diagram B19, Type T6TU5XB (IC7M00, Columbus)

Figure 1 Package outline (top view)

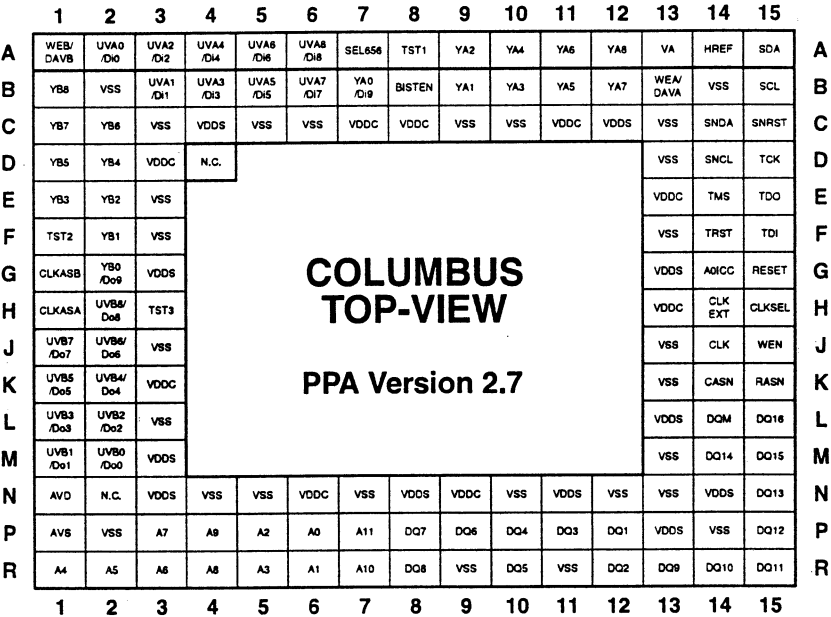
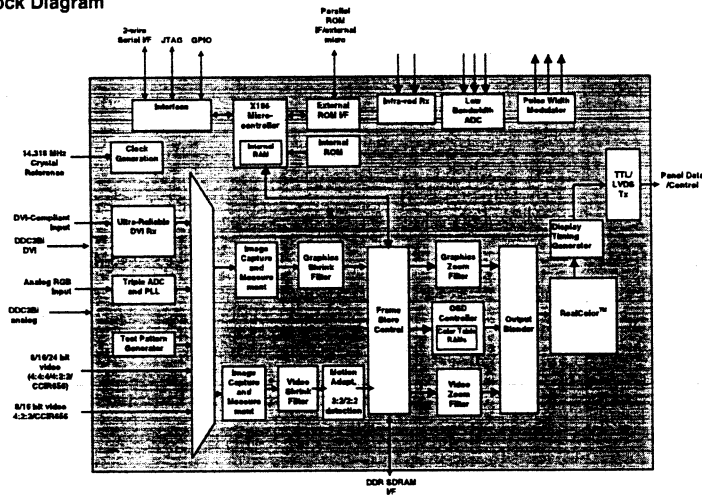


Figure 9-9 Pin configuration



9.11.3 Diagram B7+B8+B9, Type GM1501 (IC7401, Genesis)

## Block Diagram



## Pin Configuration

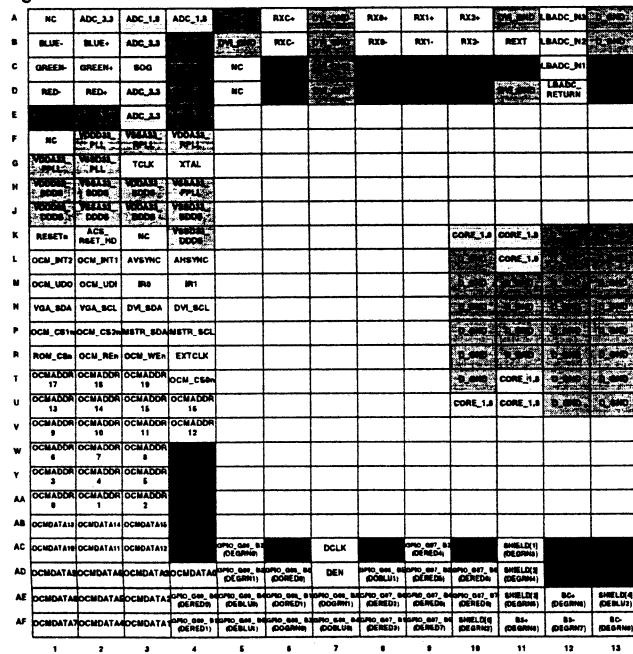
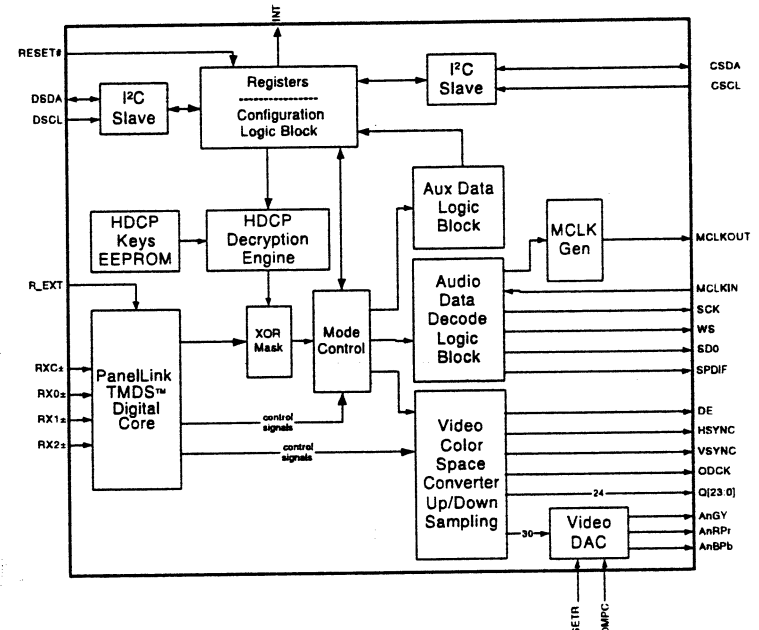


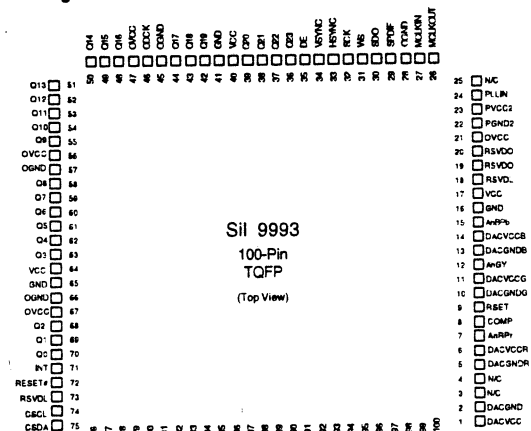
Figure 9-10 Internal block diagram and pin configuration

9.11.4 Diagram B12, Type S9993CT (IC7D03, HDMI Panellink), Reserved

## Block Diagram



## Pin Configuration



Sil 9993  
100-Pin  
TQFP  
(Top View)

Figure 9-11 Internal block diagram and pin configuration

## 10. Spare Parts List

## Set Level

## Various

|      |                |                             |
|------|----------------|-----------------------------|
| 0032 | 3122 137 23171 | Power Supply Unit (32 inch) |
| 0032 | 3122 137 23191 | Power Supply Unit (26 inch) |
| 8188 | 2422 070 98151 | MAINSCORD EUR 1M5 BK B      |
| 8903 | 3104 311 05911 | Cable 4P/560                |
| 8903 | 3139 131 05741 | Cable 04P/280               |

|      |                |                         |
|------|----------------|-------------------------|
| 5213 | 2422 264 00506 | Loudsp. 8n 5W fullrange |
| 5213 | 2422 264 00536 | Loudsp. 5W fullrange    |

## Small Signal Board [B]

## Various

|      |                |                                  |
|------|----------------|----------------------------------|
| 0601 | 3139 127 04122 | Hercules SW (check Prod. Survey) |
| 0611 | 3139 127 04112 | Scaler SW (check Prod. Survey)   |
| 1101 | 2422 025 18749 | Connector 3p m                   |
| 1102 | 3139 147 19801 | Tuner UV1315S/AH-13              |
| 1104 | 2422 549 44372 | SAW 38.9MHz K953L                |
| 1106 | 2422 549 44369 | SAW 38.9MHz K956L                |
| 1107 | 2422 025 18749 | Connector 3p m                   |
| 1202 | 2422 543 01134 | Xtal 24.576MHz                   |
| 1801 | 2422 543 01133 | Xtal 14.32MHz 20pF               |
| 1F00 | 2422 033 00515 | Socket DVI 29p f                 |
| 1F01 | 2422 025 05703 | Socket 1P/1                      |
| 1G01 | 4822 265 10703 | Socket scarf 21p                 |
| 1G02 | 4822 265 10703 | Socket scarf 21p                 |
| 1J02 | 2422 025 10779 | Connector 12p m                  |
| 1J03 | 2422 025 10768 | Connector 3p m                   |
| 1J04 | 2422 025 10769 | Connector 3p m                   |
| 1K00 | 2422 025 08149 | Connector 5p m                   |
| 1K01 | 2422 025 10772 | Connector 12p m                  |
| 1K02 | 2422 025 10768 | Connector 3p m                   |
| 1K03 | 2422 025 14531 | 20p1                             |
| 1N01 | 2422 025 17274 | Connector 10p m                  |
| 1N02 | 2422 025 18779 | Connector 40p m                  |
| 1N05 | 2722 171 08825 | Xtal 14.31818MHz 15pF            |
| 1P01 | 2422 549 45325 | Bead 67Ω at 100MHz               |
| 1P02 | 2422 549 45325 | Bead 67Ω at 100MHz               |
| 1P03 | 2422 549 45325 | Bead 67Ω at 100MHz               |
| 1P04 | 2422 549 45325 | Bead 67Ω at 100MHz               |
| 1P05 | 2422 549 45325 | Bead 67Ω at 100MHz               |
| 1P06 | 2422 025 18772 | Connector 30p m                  |
| 3J02 | 3139 131 05901 | Cable 12P/280/12P                |
| 8J03 | 3139 110 07851 | Cable 03P/1000/3P                |
| 8J04 | 3104 311 09251 | Cable 9P/1409P                   |
| 8J01 | 3139 131 05901 | Cable 12P/280/12P                |



|      |                |                     |
|------|----------------|---------------------|
| 2101 | 4822 124 12095 | 100ΩF 10% 16V       |
| 2102 | 5322 126 11583 | 100ΩF 10% 50V 0603  |
| 2103 | 5322 126 11583 | 100ΩF 10% 50V 0603  |
| 2104 | 4822 122 33761 | 22pF 5% 50V         |
| 2105 | 4822 122 33761 | 22pF 5% 50V         |
| 2106 | 5322 126 11583 | 100ΩF 10% 50V 0603  |
| 2109 | 5322 124 11945 | 22pF 20% 35V        |
| 2113 | 4822 124 12095 | 100ΩF 10% 16V       |
| 2203 | 4822 124 23002 | 100ΩF 10% 16V       |
| 2206 | 2020 552 00035 | 2.2μF 6.3V 10% 0603 |
| 2207 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2208 | 4822 124 12084 | 1μF 20% 50V         |
| 2209 | 4822 124 23002 | 100ΩF 10% 16V       |
| 2210 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2211 | 2020 552 96628 | 100ΩF 10% 16V 0402  |
| 2214 | 2020 552 96618 | 1nF 10% 50V 0402    |
| 2216 | 2020 552 96618 | 1nF 10% 50V 0402    |
| 2218 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2221 | 4822 124 12095 | 100ΩF 10% 16V       |
| 2223 | 2238 869 15101 | 100pF 5% 50V 0402   |
| 2225 | 2020 552 96618 | 1nF 10% 50V 0402    |
| 2226 | 3198 035 03320 | 3.3nF 5% 50V 0402   |
| 2227 | 2020 552 96618 | 1nF 10% 50V 0402    |
| 2228 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2230 | 3198 035 71040 | 100nF 10% 16V 0402  |

|      |                |                     |
|------|----------------|---------------------|
| 2231 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2232 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2233 | 4822 124 23002 | 100ΩF 10% 16V       |
| 2234 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2235 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2236 | 4822 126 14076 | 220nF -80/+20% 25V  |
| 2237 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2238 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2239 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2240 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2241 | 4822 124 12095 | 100ΩF 10% 6.3V 0402 |
| 2242 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2243 | 4822 124 23002 | 100ΩF 10% 16V       |
| 2244 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2245 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2246 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2250 | 2020 552 96618 | 1nF 10% 50V 0402    |
| 2251 | 2020 552 96628 | 100pF 20% 25V 1210  |
| 2252 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2253 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2254 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2255 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2256 | 4822 124 23002 | 100ΩF 10% 16V       |
| 2257 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2258 | 2020 552 96637 | 100pF 10% 6.3V 0805 |
| 2259 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2260 | 2020 552 96637 | 100pF 10% 6.3V 0805 |
| 2262 | 4822 124 12082 | 100pF 20% 50V       |
| 2263 | 3198 035 28820 | 6.8nF 10% 16V 0402  |
| 2264 | 3198 017 44740 | 470nF 10% 16V 0603  |
| 2265 | 3198 017 41060 | 1μF 10V 0603        |
| 2266 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2267 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2268 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2269 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2271 | 4822 124 12095 | 100ΩF 10% 6.3V      |
| 2272 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2273 | 2020 552 96718 | 220nF 10% 6.3V 0402 |
| 2274 | 3198 017 31540 | 150nF 10V 0603      |
| 2277 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2280 | 2020 552 00027 | 4.7μF 2% 6.3V 0603  |
| 2281 | 2020 552 00027 | 4.7μF 2% 6.3V 0603  |
| 2282 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2283 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2284 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2285 | 4822 051 30151 | 150Ω 5% 0.062W      |
| 2286 | 2222 240 59872 | 4.7μF 5% 10V 0805   |
| 2289 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2290 | 2222 240 59872 | 4.7μF 5% 10V 0805   |
| 2291 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2449 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2603 | 2020 552 96834 | 1μF 20% 6.3V 0402   |
| 2604 | 3198 035 04710 | 470pF 50V 0402      |
| 2605 | 2020 552 96834 | 1μF 20% 6.3V 0402   |
| 2608 | 2020 552 96834 | 1μF 20% 6.3V 0402   |
| 2609 | 3198 035 04710 | 470pF 50V 0402      |
| 2610 | 2020 552 96834 | 1μF 20% 6.3V 0402   |
| 2611 | 4822 124 12095 | 100ΩF 10% 16V       |
| 2613 | 3198 017 41060 | 1μF 10V 0803        |
| 2614 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2615 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2616 | 2020 552 00035 | 2.2μF 6.3V 10% 0603 |
| 2617 | 2020 552 00035 | 2.2μF 6.3V 10% 0603 |
| 2618 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2619 | 2020 552 96738 | 47μF 6.3V           |
| 2701 | 2238 869 15101 | 100pF 5% 50V 0402   |
| 2704 | 4822 124 23002 | 100ΩF 10% 16V       |
| 2716 | 2020 012 00028 | 470pF 20% 18V       |
| 2731 | 2020 552 96658 | 100pF 20% 25V 1210  |
| 2732 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2733 | 3198 035 02210 | 220pF 5% 50V 0402   |
| 2734 | 2238 787 18641 | 22nF 10% 16V 0402   |
| 2735 | 3198 035 04710 | 470pF 50V 0402      |
| 2736 | 2022 031 00308 | 22pF 20% 35V        |
| 2737 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2738 | 4822 124 80151 | 47μF 16V            |
| 2739 | 4822 124 80151 | 47μF 16V            |
| 2750 | 2020 552 00035 | 2.2μF 6.3V 10% 0603 |
| 2751 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2752 | 4822 124 80151 | 47μF 16V            |
| 2753 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2755 | 3198 035 14720 | 4.7nF 5% 25V 0402   |
| 2756 | 3198 035 04710 | 470pF 50V 0402      |
| 2757 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2758 | 2020 012 00003 | 470pF 16V 20% SMD   |
| 2759 | 2020 552 96671 | 1μF 20% 18V         |
| 2800 | 2020 021 91557 | 100pF 20% 18V       |
| 2801 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2802 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2803 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2804 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2805 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2806 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2807 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2808 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2809 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2810 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2811 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2812 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2813 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2814 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2815 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2816 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2817 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2818 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2819 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2820 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2821 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2822 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2823 | 4822 126 14519 | 22pF 5% 50V 0402    |
| 2824 | 4822 126 14519 | 22pF 5% 50V 0402    |
| 2825 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2901 | 2020 552 96618 | 1nF 10% 50V 0402    |
| 2902 | 2020 021 00046 | 470pF 20% 18V       |
| 2903 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2904 | 4822 124 80151 | 47μF 16V            |
| 2905 | 2020 021 91557 | 100pF 20% 18V       |
| 2906 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2907 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2908 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2909 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2910 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2911 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2912 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2913 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2914 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2915 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2916 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2917 | 2020 021 91557 | 100pF 20% 18V       |
| 2918 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2919 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2920 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2921 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2922 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2923 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2924 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2925 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2926 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2927 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2928 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2929 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2930 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2931 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2932 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2933 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2934 | 4822 124 80151 | 47μF 16V            |
| 2935 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2936 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2937 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2938 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2939 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2940 | 4822 124 80151 | 47μF 16V            |
| 2941 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2942 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2945 | 5322 124 41945 | 22μF 20% 35V        |
| 2946 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2947 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2948 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2949 | 3198 035 71040 | 100nF 10% 16V 0402  |
| 2950 | 5322 124 41945 | 22μF 20% 35V        |
| 2951 | 3198 035 71040 | 100nF               |

## Spare Parts List

LC4.3E AA

10.

EN 91

EN 92

10.

LC4.3E AA

## Spare Parts List

|      |                |                     |      |                |                     |      |                |                     |
|------|----------------|---------------------|------|----------------|---------------------|------|----------------|---------------------|
| 3224 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3804 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E42 | 4822 117 13545 | 1000 1% 0402        |
| 3225 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3805 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E43 | 4822 117 13545 | 1000 1% 0402        |
| 3226 | 4822 117 13545 | 1000 1% 0402        | 3806 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E44 | 4822 117 13545 | 1000 1% 0402        |
| 3227 | 4822 117 13545 | 1000 1% 0402        | 3807 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E45 | 4822 117 13545 | 1000 1% 0402        |
| 3228 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3808 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E49 | 3198 031 02290 | 22Ω 5% 0.1W 0402    |
| 3230 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3809 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E50 | 3198 031 04730 | 47Ω 5% 0402         |
| 3231 | 4822 117 13606 | 2.2kΩ 5% 0.01W 0402 | 3810 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E51 | 3198 031 04730 | 47Ω 5% 0402         |
| 3232 | 3198 031 03320 | 3.3kΩ 5% 0402       | 3811 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E52 | 3198 031 04730 | 47Ω 5% 0402         |
| 3233 | 3198 031 03320 | 3.3kΩ 5% 0402       | 3812 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E53 | 3198 031 04730 | 47Ω 5% 0402         |
| 3234 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3813 | 2350 035 10229 | 4 x 22Ω 5% 1206     | 3E54 | 3198 031 04730 | 47Ω 5% 0402         |
| 3235 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3814 | 3198 031 02290 | 22Ω 5% 0.1W 0402    | 3E55 | 3198 031 04730 | 47Ω 5% 0402         |
| 3236 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3815 | 3198 031 02290 | 22Ω 5% 0.1W 0402    | 3F00 | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3238 | 4822 117 13648 | 1000 1% 0402        | 3816 | 3198 031 02290 | 22Ω 5% 0.1W 0402    | 3F06 | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3240 | 4822 117 13648 | 1000 1% 0402        | 3817 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F10 | 3198 031 31080 | 10 5% 0603          |
| 3242 | 2322 704 61002 | 1kΩ 1%              | 3818 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F11 | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3241 | 4822 117 13648 | 1000 1% 0402        | 3820 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F16 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3242 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3822 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F17 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3243 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3824 | 3198 031 03320 | 3.3kΩ 5% 0402       | 3F18 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3245 | 3198 031 02240 | 220kΩ 5% 0.1W 0402  | 3825 | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3F19 | 3198 031 31080 | 10 5% 0603          |
| 3246 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3826 | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3F20 | 4822 051 30101 | 1000 5% 0.062W      |
| 3247 | 4822 117 13648 | 1000 1% 0402        | 3827 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F21 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3248 | 4822 117 13648 | 1000 1% 0402        | 3828 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F22 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3249 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3829 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F23 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3250 | 4822 117 13648 | 1000 1% 0402        | 3831 | 4822 117 13648 | 1000 1% 0402        | 3F24 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3251 | 4822 117 13648 | 1000 1% 0402        | 3832 | 4822 117 13648 | 1000 1% 0402        | 3F25 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3252 | 4822 117 13648 | 1000 1% 0402        | 3833 | 3198 031 01090 | 10Ω 5% 0.01W 0402   | 3F26 | 4822 051 30153 | 15kΩ 5% 0.062W      |
| 3253 | 4822 117 13648 | 1000 1% 0402        | 3834 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F27 | 4822 051 30153 | 15kΩ 5% 0.062W      |
| 3255 | 4822 117 13606 | Jumper 0402         | 3835 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F28 | 4822 051 30101 | 1000 5% 0.062W      |
| 3256 | 4822 117 13606 | Jumper 0402         | 3836 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3F29 | 4822 051 30101 | 1000 5% 0.062W      |
| 3257 | 4822 117 13606 | Jumper 0402         | 3837 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G00 | 4822 051 30151 | 1500 5% 0.062W      |
| 3258 | 4822 117 13648 | 1kΩ 5% 0402         | 3838 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G01 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3259 | 4822 117 13648 | 1kΩ 5% 0402         | 3839 | 4822 117 13648 | 1000 1% 0402        | 3G02 | 4822 117 12891 | 220kΩ 1%            |
| 3260 | 4822 117 13648 | 1000 1% 0402        | 3840 | 3198 031 02290 | 22Ω 5% 0.1W 0402    | 3G03 | 4822 051 30153 | 1500 5% 0.062W      |
| 3261 | 4822 117 13648 | 1000 1% 0402        | 3841 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G04 | 4822 051 30101 | 1000 5% 0.062W      |
| 3263 | 2322 702 70398 | 3.3kΩ 5% 0603       | 3900 | 3198 031 03320 | 3.3kΩ 5% 0402       | 3G05 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3264 | 4822 117 13601 | 22kΩ 5% 0402        | 3901 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G06 | 4822 117 12891 | 220kΩ 1%            |
| 3265 | 2322 702 70398 | 3.3kΩ 5% 0603       | 3902 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G07 | 4822 051 30153 | 1500 5% 0.062W      |
| 3266 | 3198 031 05620 | 5.6kΩ 5% 0.01W 0402 | 3903 | 4822 117 13648 | 1000 1% 0402        | 3G08 | 4822 051 30151 | 1500 5% 0.062W      |
| 3267 | 3198 031 05620 | 5.6kΩ 5% 0.01W 0402 | 3904 | 4822 117 13648 | 1000 1% 0402        | 3G12 | 2122 118 06408 | 91Ω 5% 0603         |
| 3268 | 4822 117 13648 | 1000 1% 0402        | 3A02 | 4822 117 13648 | 91Ω 5% 0402         | 3G13 | 2122 118 06408 | 91Ω 5% 0603         |
| 3272 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3B02 | 4822 117 12706 | 10kΩ 1% 0.063W 0603 | 3A12 | 2122 118 06408 | 91Ω 5% 0603         |
| 3273 | 4822 117 13648 | 1kΩ 5% 0402         | 3B03 | 2322 704 61501 | 1500 1% 0603        | 3G15 | 4822 051 30101 | 1000 5% 0.062W      |
| 3274 | 3198 031 03910 | 390Ω 1% 0402        | 3C00 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G16 | 4822 051 30101 | 1000 5% 0.062W      |
| 3275 | 4822 117 13648 | 1000 1% 0402        | 3C01 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G17 | 4822 051 30101 | 1000 5% 0.062W      |
| 3276 | 3198 031 07590 | 75Ω 5% 0402         | 3C02 | 4822 117 13648 | 1kΩ 5% 0402         | 3G26 | 4822 051 30273 | 27kΩ 5% 0.062W      |
| 3277 | 3198 031 01520 | 1.2kΩ 5% 0.01W 0402 | 3C04 | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3G27 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3280 | 4822 117 11151 | 10 5%               | 3C06 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G28 | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3281 | 3198 031 03930 | 390Ω 5% 0402        | 3C07 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G29 | 4822 051 30331 | 330Ω 5% 0.062W      |
| 3285 | 4822 117 13606 | Jumper 0402         | 3C08 | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3G30 | 4822 051 30689 | 68Ω 5% 0.063W 0603  |
| 3286 | 4822 117 13648 | 1000 1% 0402        | 3C09 | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3G31 | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3289 | 3198 031 01230 | 12kΩ 5% 0402        | 3C0E | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3G32 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3294 | 3198 031 04730 | 47Ω 5% 0402         | 3C0F | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3G33 | 4822 051 30101 | 1000 5% 0.062W      |
| 3295 | 4822 117 11297 | 100kΩ 5% 0.1W       | 3C10 | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3G34 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3431 | 4822 117 13648 | 1kΩ 5% 0402         | 3C16 | 3198 031 11030 | 4 x 10kΩ 5% 1206    | 3G37 | 4822 051 30151 | 1500 5% 0.062W      |
| 3451 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3C17 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G38 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3453 | 4822 117 13648 | 1000 1% 0402        | 3C18 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G39 | 4822 117 12891 | 220kΩ 1%            |
| 3454 | 4822 117 13648 | 1000 1% 0402        | 3E00 | 2322 705 70569 | 56Ω 5% 0402         | 3G40 | 4822 051 30153 | 15kΩ 5% 0.062W      |
| 3455 | 4822 117 13648 | 1000 1% 0402        | 3E01 | 2322 705 70569 | 56Ω 5% 0402         | 3G41 | 4822 051 30151 | 1500 5% 0.062W      |
| 3456 | 4822 117 13648 | 1000 1% 0402        | 3E02 | 2322 705 70569 | 56Ω 5% 0402         | 3G42 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3458 | 4822 117 13648 | 1000 1% 0402        | 3E06 | 3198 031 04730 | 47Ω 5% 0402         | 3G43 | 4822 117 12891 | 220kΩ 1%            |
| 3459 | 4822 117 13648 | 1000 1% 0402        | 3E07 | 3198 031 04730 | 47Ω 5% 0402         | 3G44 | 4822 051 30153 | 15kΩ 5% 0.062W      |
| 3461 | 4822 117 13648 | 1000 1% 0402        | 3E08 | 3198 031 04730 | 47Ω 5% 0402         | 3G45 | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3462 | 4822 117 13648 | 1000 1% 0402        | 3E09 | 3198 031 04730 | 47Ω 5% 0402         | 3G46 | 4822 051 30101 | 1000 5% 0.062W      |
| 3604 | 4822 117 13601 | 22kΩ 5% 0402        | 3E10 | 3198 031 04730 | 47Ω 5% 0402         | 3G48 | 4822 117 12825 | 47kΩ 1% 0.063W 0603 |
| 3605 | 4822 117 13601 | 22kΩ 5% 0402        | 3E11 | 3198 031 04730 | 47Ω 5% 0402         | 3G49 | 4822 117 12825 | 47kΩ 1% 0.063W 0603 |
| 3610 | 4822 117 11297 | 100kΩ 5% 0.1W       | 3E12 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3G51 | 4822 051 30273 | 27kΩ 5% 0.062W      |
| 3611 | 4822 117 11297 | 100kΩ 5% 0.1W       | 3E13 | 4822 117 13587 | 330Ω 5% 0402 0.01W  | 3G52 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3612 | 4822 117 13601 | 22kΩ 5% 0402        | 3E14 | 4822 117 13587 | 330Ω 5% 0402 0.01W  | 3G53 | 4822 051 30689 | 68Ω 5% 0.063W 0603  |
| 3615 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3E15 | 4822 117 13587 | 330Ω 5% 0402 0.01W  | 3G54 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3616 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  | 3E16 | 4822 117 13587 | 330Ω 5% 0402 0.01W  | 3G57 | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3618 | 4822 117 13601 | 22kΩ 5% 0402        | 3E17 | 4822 117 13587 | 330Ω 5% 0402 0.01W  | 3G58 | 4822 051 30101 | 1000 5% 0.062W      |
| 3623 | 3198 031 04730 | 47Ω 5% 0402         | 3E18 | 3198 031 04730 | 47Ω 5% 0402         | 3G59 | 4822 117 12825 | 47kΩ 1% 0.063W 0603 |
| 3625 | 3198 031 03320 | 3.3kΩ 5% 0402       | 3E19 | 2322 705 70569 | 56Ω 5% 0402         | 3G60 | 4822 117 12825 | 47kΩ 1% 0.063W 0603 |
| 3627 | 4822 117 13601 | 22kΩ 5% 0402        | 3E20 | 2322 705 70569 | 56Ω 5% 0402         | 3G96 | 4822 117 12825 | 47kΩ 1% 0.063W 0603 |
| 3630 | 4822 117 13587 | 330Ω 5% 0402 0.01W  | 3E21 | 2322 705 70569 | 56Ω 5% 0402         | 3G98 | 4822 117 12825 | 47kΩ 1% 0.063W 0603 |
| 3631 | 4822 117 13587 | 330Ω 5% 0402 0.01W  | 3E22 | 4822 117 13632 | 100kΩ 1% 0603 0.62W | 3J03 | 3198 031 06890 | 68Ω 5% 0402         |
| 3732 | 2322 704 61002 | 1kΩ 1%              | 3E23 | 3198 031 08210 | 820Ω 5% 0.5W        | 3J04 | 3198 031 06890 | 68Ω 5% 0402         |
| 3733 | 2322 704 63002 | 3.3kΩ 1% 0603       | 3E24 | 4822 117 13543 | 470Ω 5% 0402        | 3J05 | 3198 031 06890 | 68Ω 5% 0402         |
| 3734 | 4822 117 13602 | 2.2kΩ 5% 0.01W 0402 | 3E25 | 2322 705 70398 | 39Ω 5% 0402         | 3K00 | 4822 117 13545 | 1000 1% 0402        |
| 3735 | 4822 117 13548 | 1kΩ 5% 0.01W 0402   | 3E26 | 3198 031 02290 | 22Ω 5% 0.1W 0402    | 3K01 | 4822 117 13545 | 1000 1% 0402        |
| 3736 | 3198 031 04720 | 4.7kΩ 5% 0402       | 3E27 | 2322 705 70398 | 39Ω 5% 0402         | 3K02 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  |
| 3750 | 4822 117 13601 | 22kΩ 5% 0402        | 3E28 | 3198 031 02290 | 22Ω 5% 0.1W 0402    | 3K03 | 3198 031 01530 | 15kΩ 5% 0.01W 0402  |
| 3751 | 3198 031 31080 | 10 5% 0603          | 3E29 | 2322 705 70398 | 39Ω 5% 0402         | 3K06 | 4822 117 13606 | 10kΩ 5% 0.01W 0402  |
| 3752 | 3198 031 31080 | 10 5% 0603          | 3E30 | 3198 031 02290 | 22Ω 5% 0.1W 0402    | 3K06 | 3198 031 01530 | 15kΩ 5% 0.01W 0402  |
| 3753 | 23             |                     |      |                |                     |      |                |                     |

|      |                |                     |
|------|----------------|---------------------|
| 7900 | 9322 142 88668 | LF25CDT             |
| 7901 | 9322 189 19668 | LD1086D2T18         |
| 7801 | 9322 214 42671 | KAD263238F-QC50     |
| 7C00 | 9322 205 12671 | MX26LV04QOC-70G     |
| 7C01 | 9322 206 23668 | M24C32-WMN6P        |
| 7C02 | 9322 215 36685 | PST596JN            |
| 7E00 | 9322 195 23668 | ADG733BRU           |
| 7E01 | 9322 199 80668 | SM5301BS-G          |
| 7E02 | 9322 199 56668 | ADG781BCP           |
| 7E03 | 4822 209 60792 | 74HC4053D           |
| 7E04 | 9352 607 39118 | 74LVC14APW          |
| 7E05 | 9352 607 39118 | 74LVC14APW          |
| 7F03 | 9322 206 24668 | M24C02-WMN6P        |
| 7G03 | 3198 010 42310 | BC847BW             |
| 7G05 | 3198 010 42310 | BC847BW             |
| 7G10 | 4822 209 60792 | 74HC4053D           |
| 7L01 | 3198 010 42310 | BC847BW             |
| 7L02 | 3198 010 42310 | BC847BW             |
| 7L03 | 3198 010 42310 | BC847BW             |
| 7L04 | 9322 212 77612 | MS7988SC-LF-110     |
| 7L05 | 4822 209 17388 | LD11170T33          |
| 7L06 | 9965 000 04199 | BSN20               |
| 7L07 | 9965 000 04199 | BSN20               |
| 7M00 | 9322 204 76671 | T6TUSXBG-0001       |
| 7M01 | 9322 206 19672 | MSM56V16160F-7T3-FG |
| 7M03 | 9322 170 14688 | LF15ABDT            |
| 7N01 | 9322 210 01688 | EPC84518N           |
| 7N02 | 9322 217 35671 | EP1C12F256C8N       |
| 7N03 | 9340 425 20115 | BC847BS             |
| 7N04 | 9322 210 59668 | THC63LVDF84B        |
| 7P01 | 9322 170 14688 | LF15ABDT            |
| 7P02 | 9322 201 03668 | THC63LVDM83R        |

## Audio Amplifier Panel [C]

## Various

|      |                |                |
|------|----------------|----------------|
| 1001 | 2422 025 09406 | Connector 4p m |
| 1002 | 2422 025 10789 | Connector 8p m |
| 1003 | 2422 025 10768 | Connector 3p m |

|      |                |                      |
|------|----------------|----------------------|
| 2001 | 2020 024 00023 | 220µ 35V             |
| 2002 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2003 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2004 | 2020 024 00023 | 220µ 35V             |
| 2006 | 2020 552 94427 | 100pF 5% 50V         |
| 2007 | 2020 552 94427 | 100pF 5% 50V         |
| 2008 | 2020 552 94427 | 100pF 5% 50V         |
| 2009 | 2020 552 94427 | 100pF 5% 50V         |
| 2010 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2011 | 4822 051 30562 | 5.6kΩ 5% 0.063W 0603 |
| 2012 | 2020 024 00023 | 220µ 35V             |
| 2013 | 4822 126 13879 | 220nF +80-20% 16V    |
| 2014 | 4822 126 14238 | 2.2nF 50V 0603       |
| 2015 | 4822 126 14238 | 2.2nF 50V 0603       |
| 2016 | 4822 126 14238 | 2.2nF 50V 0603       |
| 2017 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2018 | 3198 017 31530 | 15nF 20% 50V 0603    |
| 2019 | 3198 037 52280 | 2.2µ 50V             |
| 2020 | 4822 126 13883 | 220pF 5% 50V         |
| 2021 | 4822 126 13883 | 220pF 5% 50V         |
| 2022 | 4822 126 14075 | 220nF +80/-20% 25V   |
| 2023 | 4822 121 51252 | 470nF 5% 63V         |
| 2024 | 2020 012 00036 | 1000µ 25V            |
| 2026 | 4822 126 13879 | 220nF +80-20% 16V    |
| 2027 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2028 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2029 | 2020 024 00023 | 220µ 35V             |
| 2030 | 4822 126 14238 | 2.2nF 50V 0603       |
| 2031 | 4822 126 14238 | 2.2nF 50V 0603       |
| 2032 | 4822 126 14238 | 2.2nF 50V 0603       |
| 2033 | 4822 126 13879 | 220nF +80-20% 16V    |
| 2034 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2035 | 4822 126 13883 | 220pF 5% 50V         |
| 2036 | 4822 126 13883 | 220pF 5% 50V         |
| 2037 | 3198 037 52280 | 2.2µ 50V             |
| 2038 | 3198 017 31530 | 15nF 20% 50V 0603    |
| 2039 | 2020 552 96656 | 10µF 20% 25V 1210    |
| 2040 | 4822 126 13879 | 220nF +80-20% 16V    |
| 2041 | 2020 552 96656 | 10µF 20% 25V 1210    |
| 2042 | 4822 121 51252 | 470nF 5% 63V         |
| 2043 | 2020 012 00036 | 1000µ 25V            |
| 2044 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2045 | 4822 126 14075 | 220nF +80/-20% 25V   |
| 2047 | 3198 017 41050 | 1µF 10V 0603         |
| 2048 | 2238 586 59812 | 100nF 20% 50V 0603   |
| 2051 | 2020 552 94427 | 100pF 5% 50V         |
| 2052 | 4822 126 14238 | 2.2nF 50V 0603       |
| 2053 | 4822 126 14238 | 2.2nF 50V 0603       |

|      |                |                     |
|------|----------------|---------------------|
| 2054 | 4822 126 14238 | 2.2nF 50V 0603      |
| 2055 | 4822 126 14238 | 2.2nF 50V 0603      |
| 2060 | 4822 126 14238 | 2.2nF 50V 0603      |
| 2061 | 4822 126 14238 | 2.2nF 50V 0603      |
| 2062 | 3198 017 34730 | 47nF 16V 0603       |
| 2063 | 3198 017 34730 | 47nF 16V 0603       |
| 2064 | 5322 126 11579 | 3.3nF 10% 63V       |
| 2065 | 5322 126 11579 | 3.3nF 10% 63V       |
| -WW- |                |                     |
| 3001 | 5322 117 11726 | 10Ω 5%              |
| 3003 | 4822 051 30223 | 22kΩ 5% 0.062W      |
| 3004 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3005 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3007 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3008 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3009 | 4822 117 12891 | 220kΩ 1%            |
| 3010 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3011 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3012 | 4822 051 20108 | 10Ω 5% 0.1W         |
| 3013 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3014 | 2322 762 60229 | 22Ω 5% 1005         |
| 3019 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3020 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3021 | 4822 051 30472 | 4.7Ω 5% 0.062W      |
| 3022 | 9965 000 23108 | 22Ω 5% 0603         |
| 3023 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3024 | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3025 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3026 | 4822 051 30682 | 6.8Ω 5% 0.062W      |
| 3027 | 4822 117 12891 | 220kΩ 1%            |
| 3028 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3029 | 4822 051 30222 | 2.2kΩ 5% 0.062W     |
| 3030 | 4822 051 20108 | 10Ω 5% 0.1W         |
| 3031 | 2322 762 60229 | 22Ω 5% 1005         |
| 3032 | 4822 051 30392 | 3.9Ω 5% 0.063W 0603 |
| 3033 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3034 | 4822 051 30392 | 3.9Ω 5% 0.063W 0603 |
| 3037 | 4822 051 30392 | 3.9Ω 5% 0.063W 0603 |
| 3039 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3040 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3041 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3042 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3043 | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3046 | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3047 | 4822 051 30102 | 1kΩ 5% 0.062W       |

|      |                |                     |
|------|----------------|---------------------|
| 5001 | 2422 549 44197 | Beed 220Ω at 100MHz |
| 5002 | 3198 018 52280 | 2.2µF 10% 1008      |
| 5003 | 3198 018 52280 | 2.2µF 10% 1008      |
| 5004 | 3198 018 52280 | 2.2µF 10% 1008      |
| 5005 | 3198 018 52280 | 2.2µF 10% 1008      |
| 5006 | 2422 536 01034 | 33µ                 |
| 5007 | 2422 536 01034 | 33µ                 |

|      |                |       |
|------|----------------|-------|
| 6002 | 4822 130 80622 | BAT54 |
| 6003 | 4822 130 80622 | BAT54 |



|      |                |             |
|------|----------------|-------------|
| 7000 | 9352 760 45118 | TDA8931T/N1 |
| 7001 | 9352 760 45118 | TDA8931T/N1 |
| 7004 | 9322 209 56685 | TL431ACDBV  |

## Keyboard Control Panel [E]

## Various

|      |                |                            |
|------|----------------|----------------------------|
| 0100 | 3139 129 90041 | PROCESS BOX PCB<br>PNL LFS |
| 0229 | 3122 120 01701 | FACTORY PLATE              |
| 1309 | 4822 278 13775 | Switch 1p 0.1A 12V         |
| 1310 | 4822 278 13775 | Switch 1p 0.1A 12V         |
| 1311 | 4822 278 13775 | Switch 1p 0.1A 12V         |
| 1312 | 4822 276 13775 | Switch 1p 0.1A 12V         |
| 1313 | 4822 276 13775 | Switch 1p 0.1A 12V         |
| 1314 | 4822 276 13775 | Switch 1p 0.1A 12V         |
| 1684 | 4822 287 10459 | Connector 3p               |
| 8684 | 3139 131 04421 | Cable 03P/340/03P          |
| -WW- |                |                            |
| 3318 | 4822 061 30151 | 150Ω 5% 0.062W             |
| 3319 | 4822 061 30391 | 390Ω 5% 0.062W             |

|      |                |                      |
|------|----------------|----------------------|
| 3320 | 3198 021 31820 | 1.8kΩ 5% 0.062W 0603 |
| 3321 | 4822 117 12968 | 820Ω 5% 0.62W        |
| 3322 | 4822 051 30008 | Jumper 0603          |
| 3323 | 4822 051 30008 | Jumper 0603          |
| 3324 | 4822 051 30561 | 560Ω 5% 0.062W       |

|      |                |         |
|------|----------------|---------|
| 6306 | 4822 130 11148 | UDZ4.7B |
|------|----------------|---------|

## Side AV Panel [G]

## Various

|      |                |                    |
|------|----------------|--------------------|
| 1301 | 2422 025 14531 | 20p f              |
| 1301 | 4822 267 10484 | YKF51-5359         |
| 1302 | 2422 025 10738 | Connector 8p m     |
| 1302 | 2422 028 06655 | Socket CINCIN 3P F |
| 1303 | 2422 028 05059 | Connector Phone    |
| 1304 | 2422 025 10772 | Connector 12p m    |
| 1306 | 2422 028 05059 | Connector Phone    |
| 1307 | 4822 267 10484 | YKF51-5359         |
| 1308 | 2422 028 05513 | Soc phone 1p       |

|       |                |                   |
|-------|----------------|-------------------|
| 2301  | 3198 017 41050 | 1µF 10V 0603      |
| 2302  | 4822 126 11785 | 47pF 5% 50V 0603  |
| 2302  | 4822 126 14241 | 330pF 0603 50V    |
| 2303  | 3198 017 41050 | 1µF 10V 0603      |
| 2304  | 4822 126 11785 | 47pF 5% 50V 0603  |
| 2304  | 4822 126 14241 | 330pF 0603 50V    |
| 2305  | 4822 126 14241 | 330pF 0603 50V    |
| 2306  | 4822 126 14241 | 330pF 0603 50V    |
| 2307  | 4822 126 14241 | 330pF 0603 50V    |
| 2308  | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2308  | 5322 126 11583 | 10nF 10% 50V 0603 |
| 2310A | 3198 017 41050 | 1µF 10V 0603      |
| 2326  | 3198 017 41050 | 1µF 10V 0603      |

|       |                |                     |
|-------|----------------|---------------------|
| 3301  | 4822 051 30101 | 100Ω 5% 0.062W      |
| 3301  | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3302  | 4822 051 30109 | 10Ω 5% 0.062W       |
| 3302  | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3303  | 4822 051 30109 | 10Ω 5% 0.062W       |
| 3303  | 4822 051 30221 | 220Ω 5% 0.062W      |
| 3304  | 4822 051 30223 | 22kΩ 5% 0.062W      |
| 3304  | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3305  | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3305  | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3306  | 4822 051 30153 | 15kΩ 5% 0.062W      |
| 3306  | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3307  | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3307  | 4822 051 30223 | 22kΩ 5% 0.062W      |
| 3308  | 4822 051 30153 | 15kΩ 5% 0.062W      |
| 3308  | 4822 117 12925 | 47kΩ 1% 0.063W 0603 |
| 3309A | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3310A | 4822 051 30683 | 58kΩ 5% 0.062W      |
| 3311  | 4822 051 30103 | 10kΩ 5% 0.062W      |
| 3325  | 4822 051 30759 | 75Ω 5% 0.062W       |
| 3326  | 4822 051 30102 | 1kΩ 5% 0.062W       |
| 3327  | 4822 117 13632 | 100kΩ 1% 0603 0.62W |
| 3328  | 4822 051 30101 | 100Ω 5% 0.062W      |
| 3329  | 4822 051 30583 | 58kΩ 5% 0.062W      |

|      |                |           |
|------|----------------|-----------|
| 6301 | 9322 129 41685 | BZM55-C12 |
| 6302 | 9322 129 41685 | BZM55-C12 |
| 6303 | 9322 129 41685 | BZM55-C12 |
| 6304 | 9322 129 41685 | BZM55-C12 |
| 6305 | 9322 129 41685 | BZM55-C12 |
| 6306 | 9322 129 41685 | BZM55-C12 |
| 6307 | 9322 129 41685 | BZM55-C12 |
| 6308 | 9322 129 41685 | BZM55-C12 |
| 6310 | 4822 130 11416 | PDZ6.8B   |
| 6311 | 4822 130 11416 | PDZ6.8B   |



|       |                |        |
|-------|----------------|--------|
| 7301A | 4822 130 60373 | BC856B |
| 7326  | 4822 130 60373 | BC856B |

## IR/LED/Light-sensor Panel [J]

## Various

|      |                |                     |
|------|----------------|---------------------|
| 0080 | 3139 120 10171 | Light sensor holder |
| 1540 | 2422 025 10738 | Connector 8p m      |
| 1870 | 4822 265 31067 | Connector 7p m      |

|      |                |                    |
|------|----------------|--------------------|
| 2540 | 4822 124 41643 | 100µF 20% 16V      |
| 2541 | 3198 017 41050 | 1µF 10V 0603       |
| 2801 | 2020 552 96637 | 10µF 10% 6.3V 0805 |
| 2802 | 2020 552 96637 | 10µF 10% 6.3V 0805 |
| 2803 | 3198 017 41050 | 1µF 10V 0603       |

|      |                |                 |
|------|----------------|-----------------|
| 3540 | 4822 051 30331 | 330Ω 5% 0.062W  |
| 3542 | 4822 051 30221 | 220Ω 5% 0.062W  |
| 3544 | 4822 051 30332 | 3.3k 5% 0.062W  |
| 3547 | 3198 021 32250 | 2.2MΩ 5% 0.0603 |
| 3801 | 4822 051 30332 | 3.3k 5% 0.062W  |
| 3802 | 4822 051 30331 | 330Ω 5% 0.062W  |
| 3803 | 4822 051 30221 | 220Ω 5% 0.062W  |
| 3809 | 3198 021 32250 | 2.2MΩ 5% 0.0603 |

## 11. Revision List

**Manual xxxx xxx xxxx.0**

- First release.

**Manual xxxx xxx xxxx.1**

- Corrected several errors in the text, drawings and spare parts list.

**Manual xxxx xxx xxxx.2**

- Corrected several errors in the text, drawings and spare parts list.